

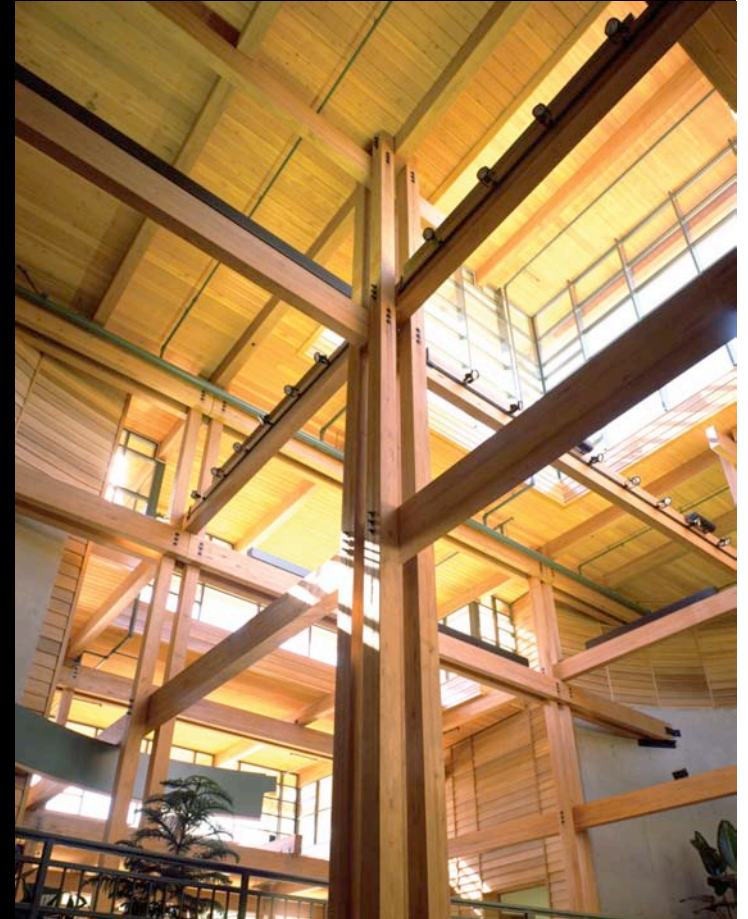
The Ultimate Design Problem:

Can a design revolution meet humanity's greatest challenge?



Ball State University
16 September 2005
Bob Berkebile, FAIA





Total New Construction Project Statistics



- 126 total certified projects
- 1515 total registered projects
- 50 states with projects
- 12 countries with projects
- 185,263,812 gross square feet of projects

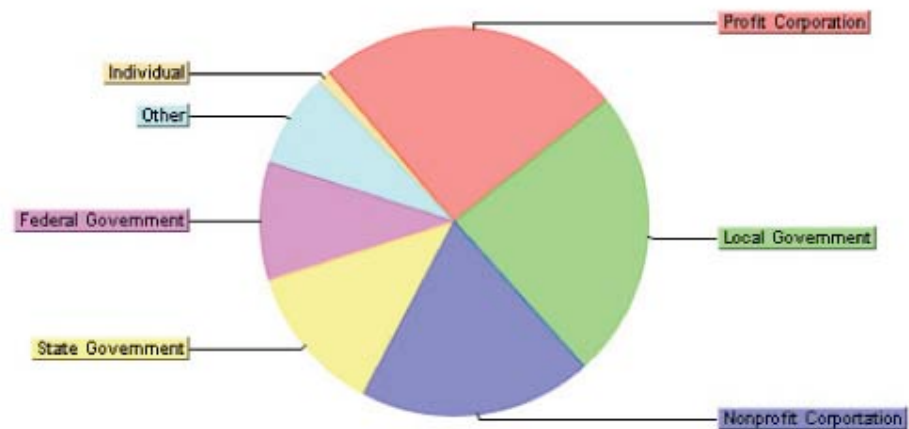


Figure III-1. Level of Green Standard and Average Green Cost Premium

Level of Green Standard	Average Green Cost Premium
Level 1 – Certified	0.66%
Level 2 – Silver	2.11%
Level 3 – Gold	1.82%
Level 4 – Platinum	6.50%
Average of 33 Buildings	1.84%

Source: USGBC, Capital E Analysis



Pricewaterhouse Coopers Report on Sustainability

- An overwhelming number of companies (89%) thought that there would be more emphasis on sustainability within the next five years
- The sustainable survey analysis cites the number one anticipated driver for increased business emphasis on sustainability as **reputation**.
- Companies surveyed then cited customer/consumer demand as the second most important driver that influences an increased visibility on sustainability in the company.
- These two are followed by:

Industry Trends (39%)

Cost Saving (36%)

CEO/Board Commitment



A PLAN FOR A BRIGHT FUTURE BEYOND 2050

SCIENTIFIC AMERICAN

**SPECIAL
ISSUE**

SEPTEMBER 2005
WWW.SCIAM.COM

*The human race is at a unique turning point.
Will we choose to create the best of all possible worlds?*



Crossroads for Planet Earth

The Population Peak • Energy Solutions

The New Face of Disease • Water and Wealth

How to Save Species • Ending Poverty



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INTRODUCTION

THE CLIMAX OF HUMANITY

BY GEORGE MUSSER

Demographically and economically, our era is unique in human history. Depending on how we manage the next few decades, we could usher in environmental sustainability—or collapse

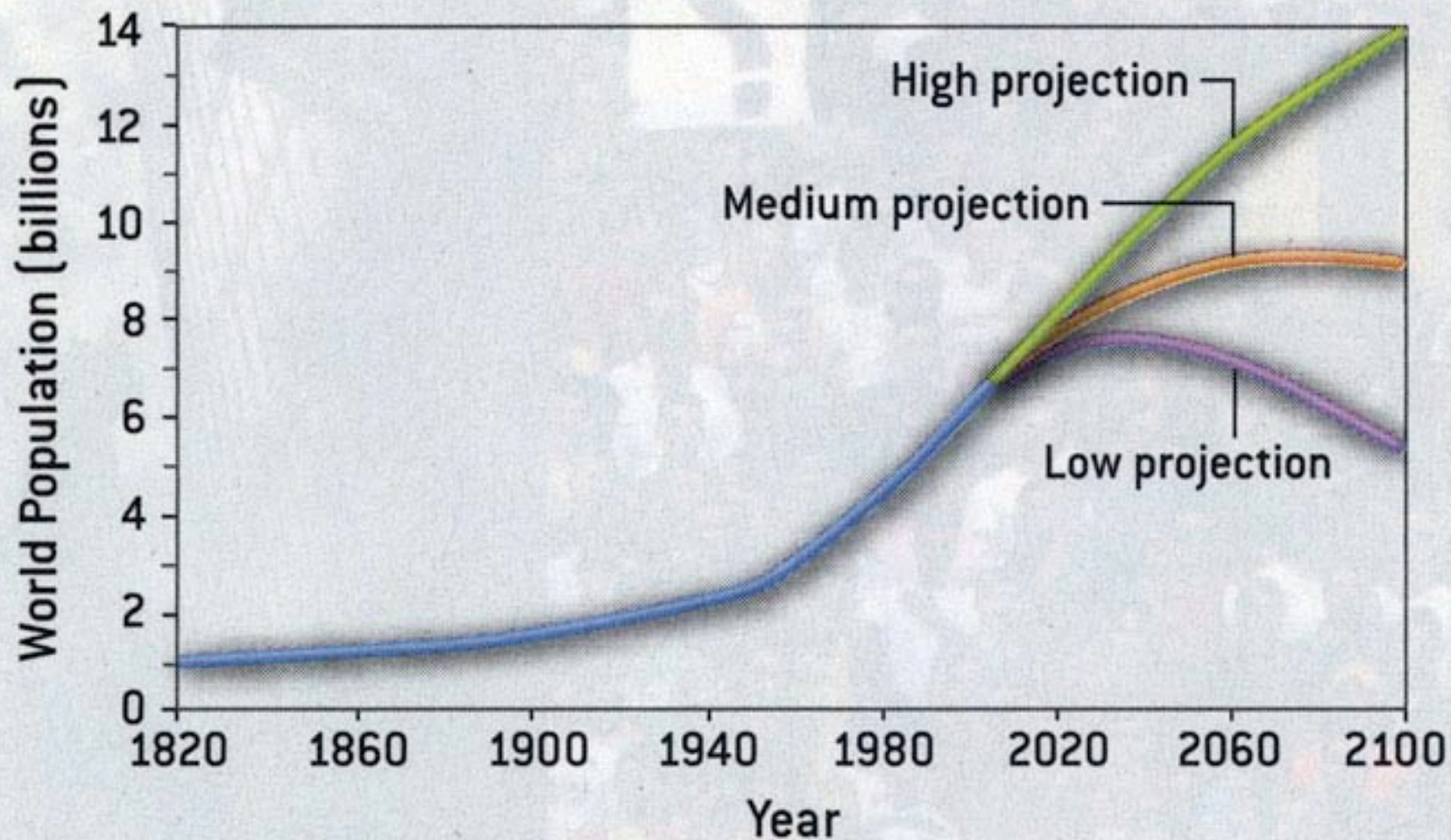
The 21st century feels like a let-down. We were promised flying cars, space colonies and 15-hour workweeks. Robots were supposed to do our chores, except when they were organizing rebellions; children were supposed to learn about disease from history books; portable fusion reactors were supposed to be on sale at the Home Depot. Even dystopian visions of the future predicted leaps of technology and social organization that leave our era in the dust.

dioxide three times as fast as the oceans and land can absorb it; midcentury is when climatologists think global warming will really begin to bite. At the rate things are going, the world's forests and fisheries will be exhausted even sooner.

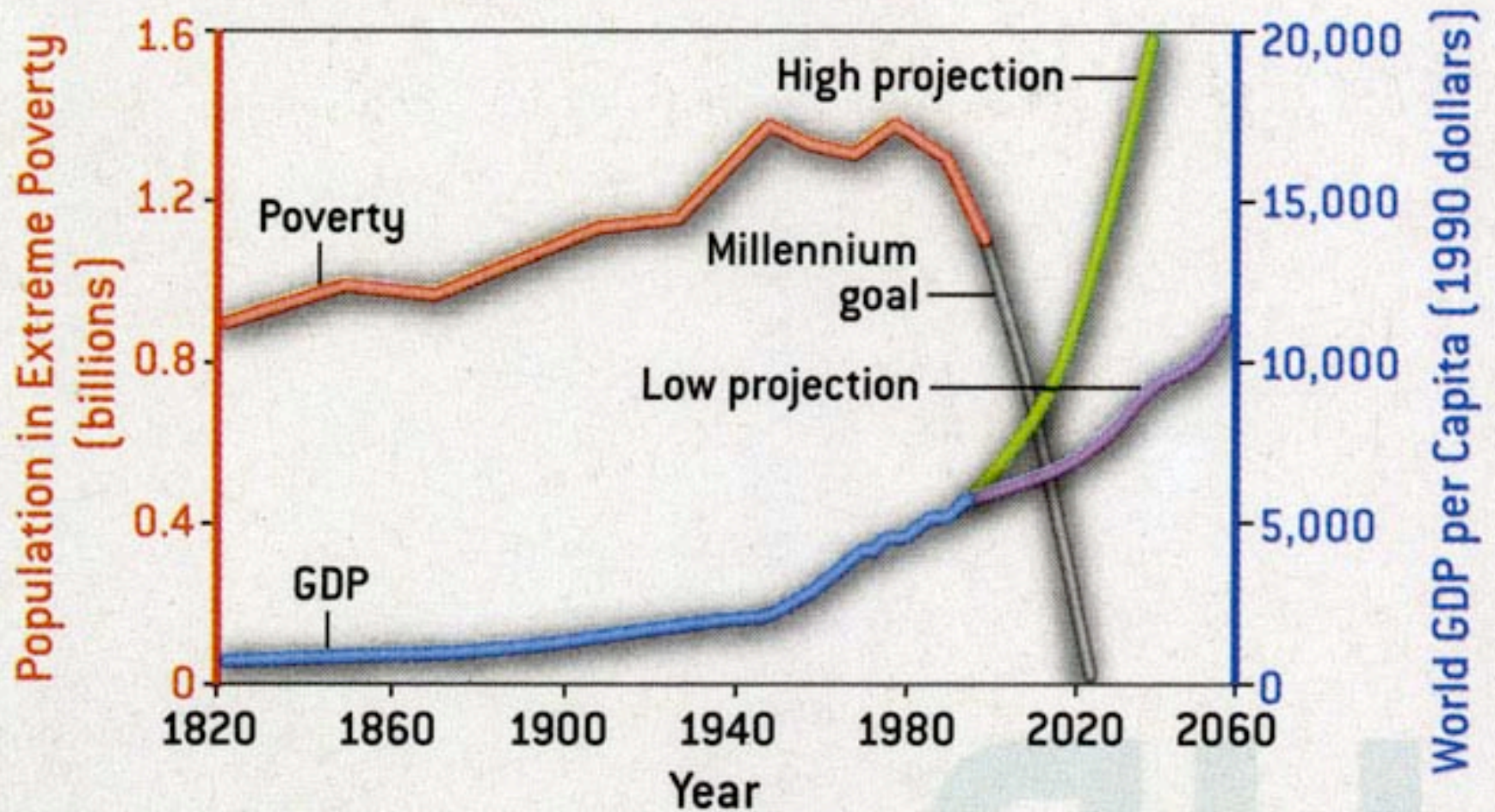
These three concurrent, intertwined transitions—demographic, economic, environmental—are what historians of the future will remember when they look back on our age. They are transforming everything from geopolitics to the struc-

THREE WORLD-CHANGING TRANSITIONS

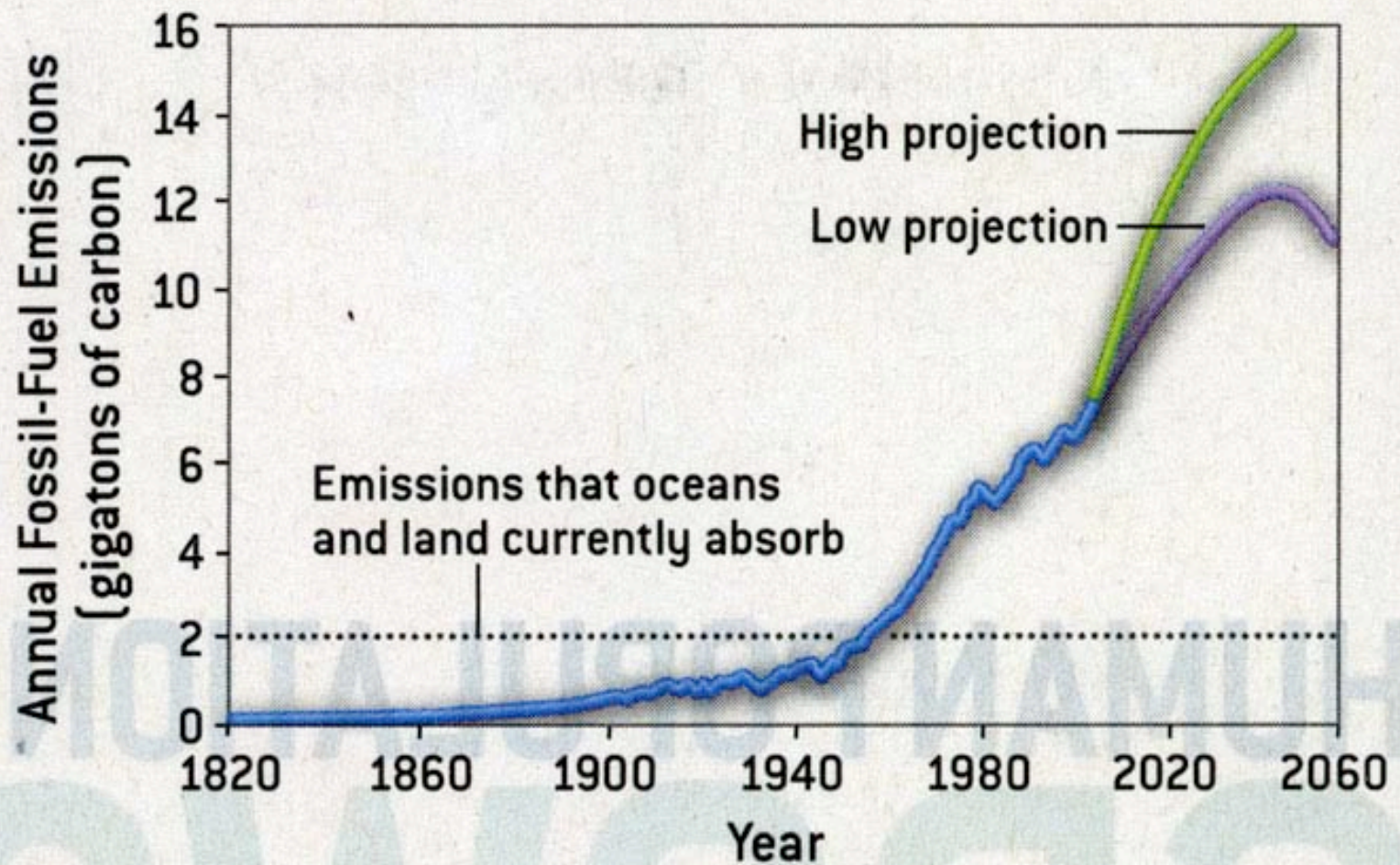
POPULATION GROWTH IS SLOWING ...



... PROSPERITY IS SPREADING ...



... BUT CO₂ EMISSIONS ARE TROUBLING

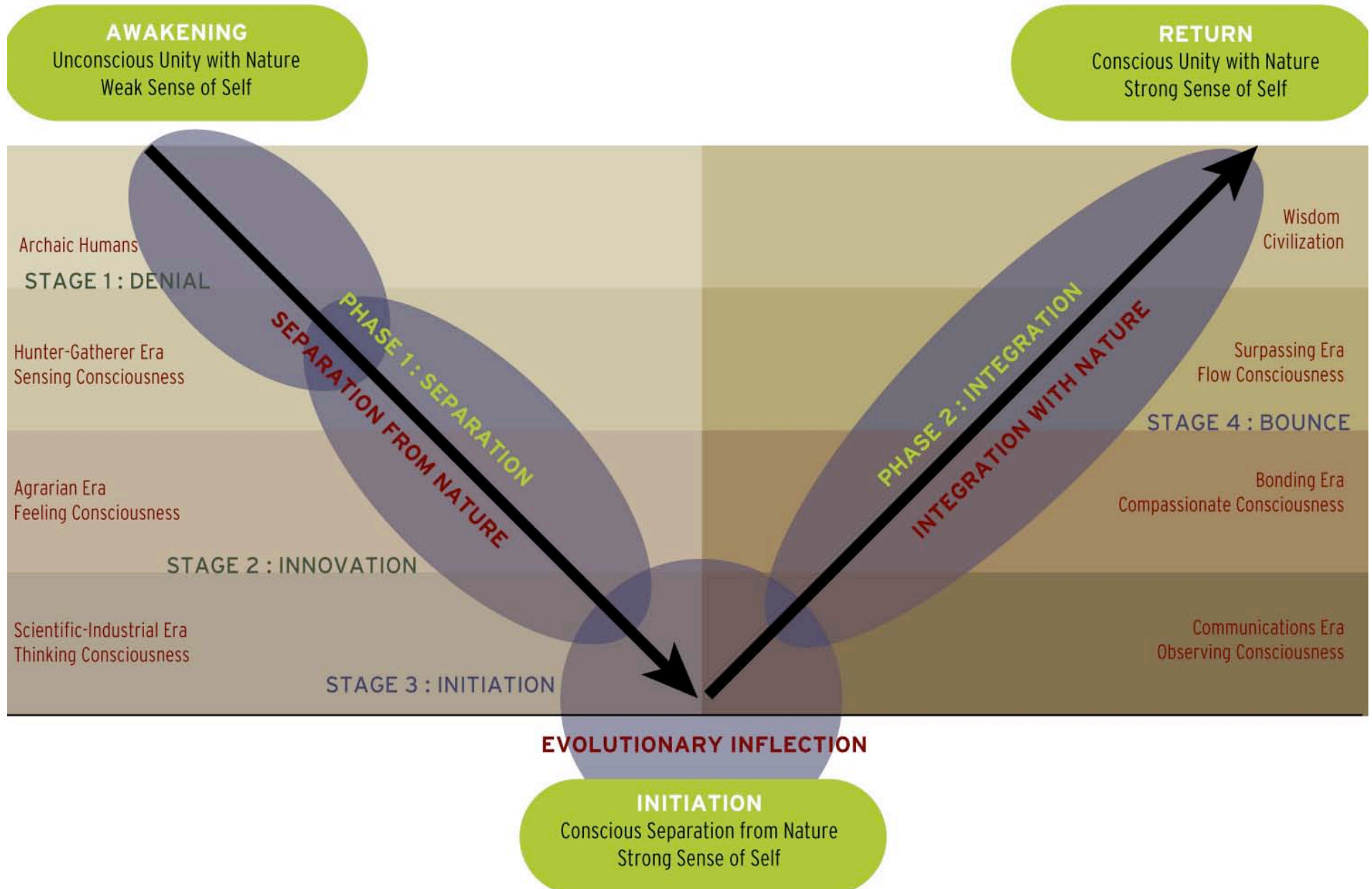




TWO MAJOR PHASES IN THE HUMAN JOURNEY

STAGES OF EVOLUTIONARY INITIATION + TRANSITION

STAGES IN THE UNFOLDING OF CIVILIZATION + CONSCIOUSNESS



TWO MAJOR PHASES IN THE HUMAN
STAGES OF EVOLUTIONARY INITIATION
STAGES IN THE UNFOLDING OF

AWAKENING

Unconscious Unity with Nature
Weak Sense of Self

Archaic Humans

STAGE 1 : DENIAL

Hunter-Gatherer Era
Sensing Consciousness

Agrarian Era
Feeling Consciousness

STAGE 2 : INNOVATION

Scientific-Industrial Era
Thinking Consciousness

STAGE 3 : INITIATION

EVOLUTIONARY INFLECTION

INITIATION

Conscious Separation from Nature
Strong Sense of Self

PHASE 1 : SEPARATION
SEPARATION FROM NATURE

PHASE 2 : INTEGRATION
INTEGRATION WITH NATURE

Bonding Era
Compassionate Consciousness

Communications Era
Observing Consciousness



TWO MAJOR PHASES IN THE HUMAN EVOLUTIONARY INITIATION STAGES OF EVOLUTIONARY INITIATION STAGES IN THE UNFOLDING OF

AWAKENING

Unconscious Unity with Nature
Weak Sense of Self

Archaic Humans

STAGE 1 : DENIAL

Hunter-Gatherer Era
Sensing Consciousness

Agrarian Era
Feeling Consciousness

STAGE 2 : INNOVATION

Scientific-Industrial Era
Thinking Consciousness

STAGE 3 : INITIATION

EVOLUTIONARY INITIATION

INITIAL
Conscious Separation
Strong Sense of Self

PHASE 1 : SEPARATION
SEPARATION FROM NATURE





Scientific-Industrial Era
Thinking Consciousness



Communications Era
Observing Consciousness

STAGE 3 : INITIATION

EVOLUTIONARY INFLECTION

INITIATION

Conscious Separation from Nature
Strong Sense of Self

TWO MA
STAGES
STAGES

AWAKENING

Unconscious Unity with Nature
Weak Sense of Self

Archaic Humans

STAGE 1: DENIAL

Hunter-Gatherer Era
Sensing Consciousness

Agrarian Era
Feeling Consciousness

STAGE 2: INNOVATION

Scientific-Industrial Era
Thinking Consciousness

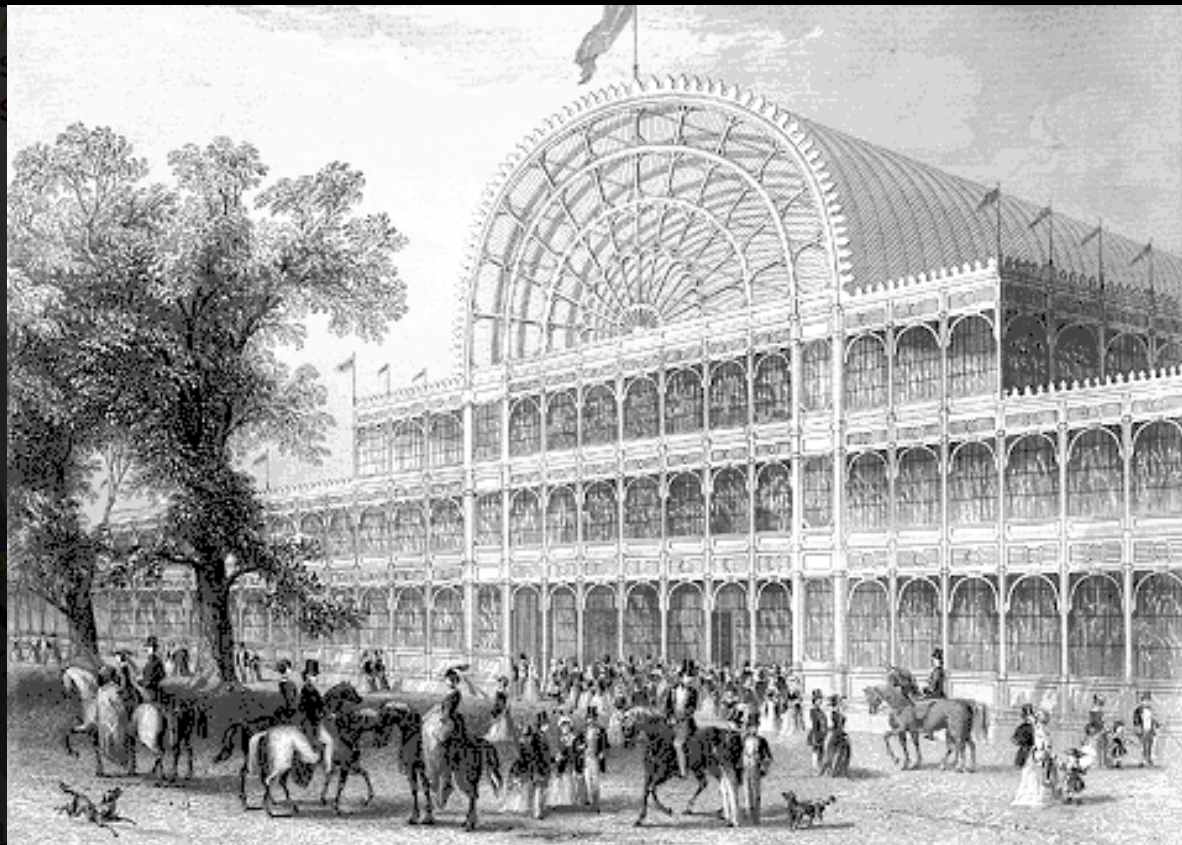
STAGE 3: INITIATION

Communications Era
Observing Consciousness

EVOLUTIONARY INFLECTION

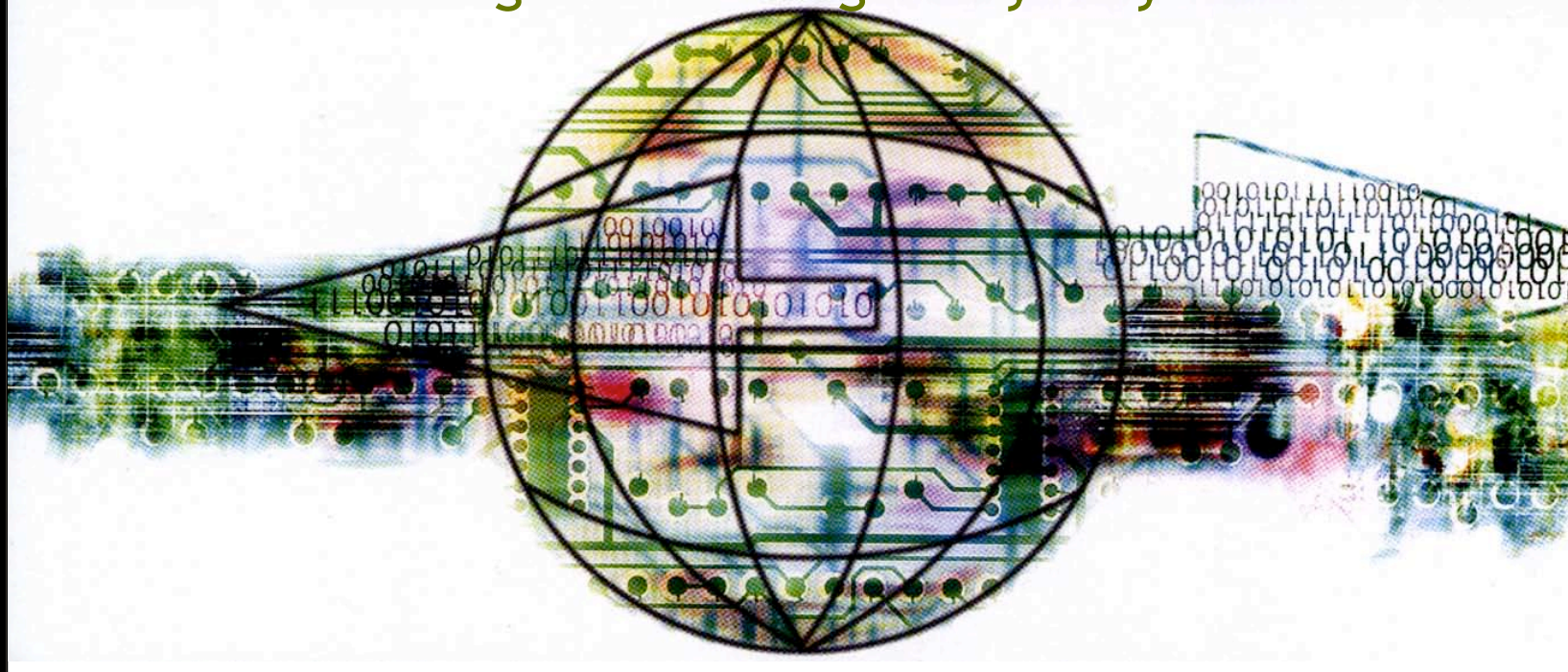
INITIATION

Conscious Separation from Nature
Strong Sense of Self



Pervasive Exponential Growth

The rate of change is doubling every 10 years



Scientific-Industrial Era
Thinking Consciousness

STAGE 3 : INITIATION

Communications Era
Observing Consciousness

EVOLUTIONARY INFLECTION

INITIATION

Conscious Separation from Nature
Strong Sense of Self

Children's Drawings

based on research in neuroscience



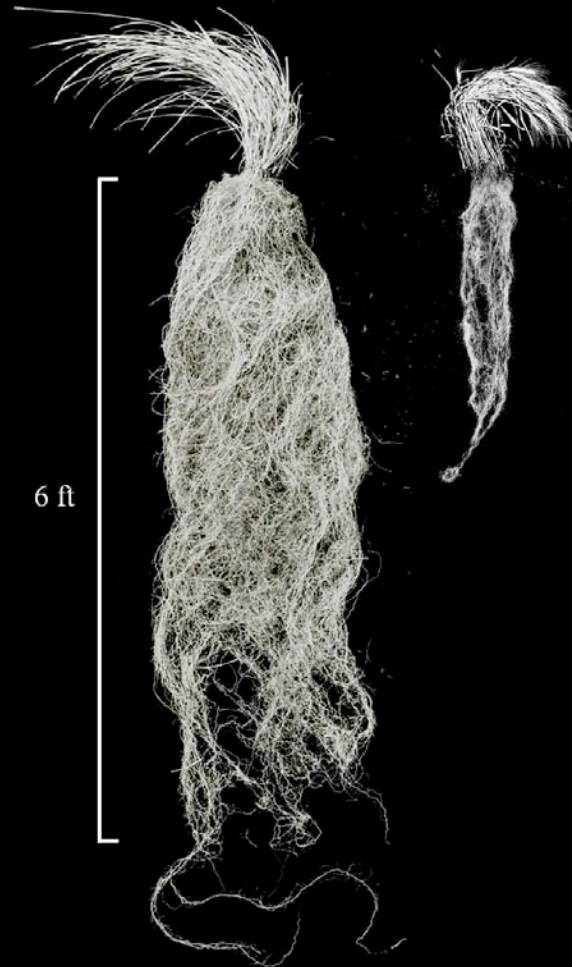


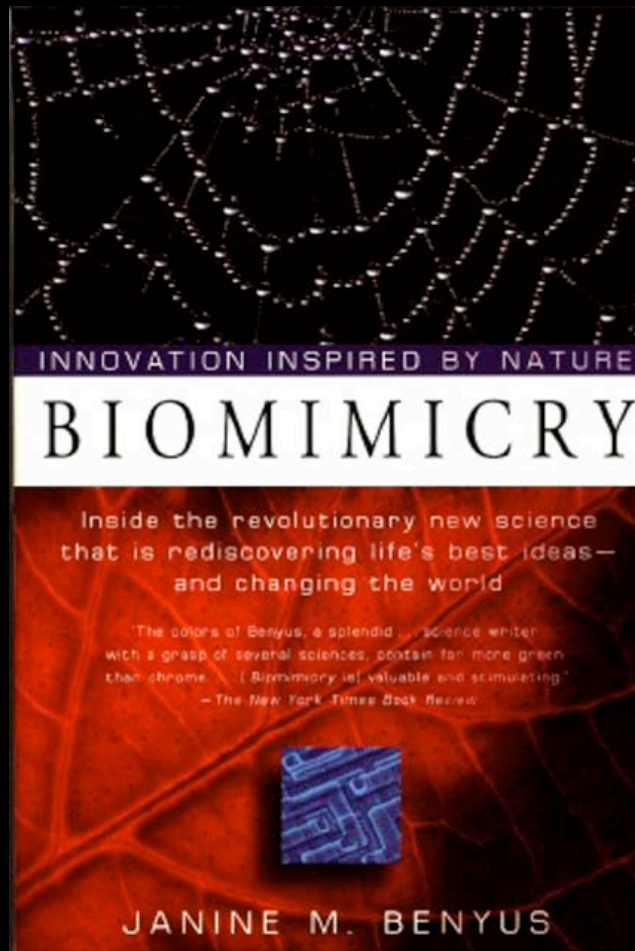


**"We do not seek to imitate nature, but
rather to find the principles she uses."**

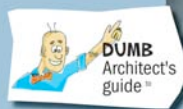
-Buckminster Fuller

New Wheat & Bluestem





Ecotone Publishing



Glazing Selection



WHO'S GREEN?

The Directory of Who's Green in the Design and Construction Field

2006

ECOtone
publishing company

What's Inside

the ecological engineer

Volume One
KEEN Engineering

DAVID R. MACAULAY
JASON F. MCLENNAN
Foreword by BOB BERKEBILE

THE PHILOSOPHY OF SUSTAINABLE DESIGN



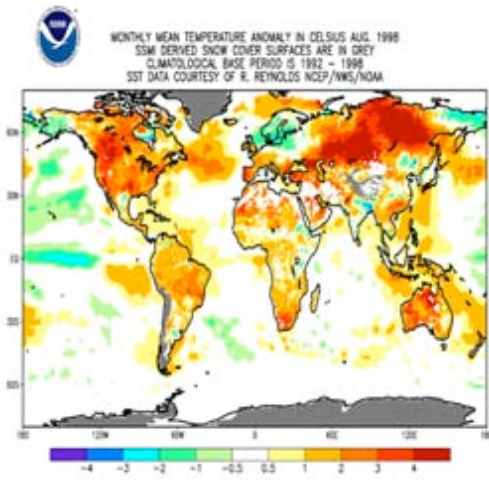
JASON F. MCLENNAN



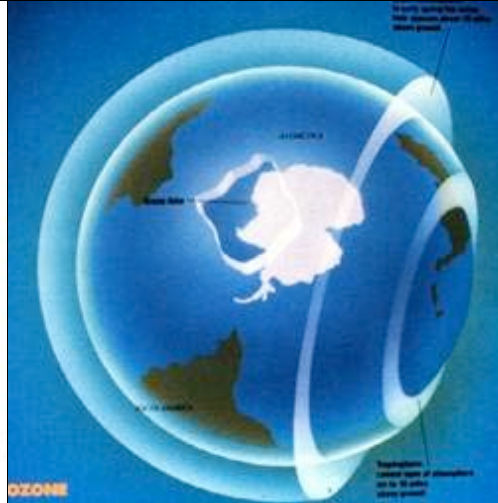
Creating a Doll's Eye View
of a Healthier World.



Toll on the Environment



Global Warming



Ozone Depletion



Air Pollution



Soil Erosion &
Water Pollution

“Every living system is in decline and the rate of decline is increasing.”

-The Union of Concerned Scientists

Building For Sustainability: Sustainability Matrix

Building Form

Energy, Pollution and External Cost to Society

● = 5 Households
● = Energy Consumed by the Building
● = Energy Generated by the Building

Width of Bar = Amount of Energy Required
Height of Bar = % of Energy Obtained from the Grid

■ = Carbon Dioxide (tons) - Global Warming
■ = Sulfur Dioxide (lbs.) - Acid Rain
■ = Nitrogen Dioxide (lbs.) - Smog
■ = Particulate Matter < 10 Microns (lbs.) - Air Quality

Schedules

■ = Additional Research
■ = Design
■ = Construction

Short and Long Term Costs

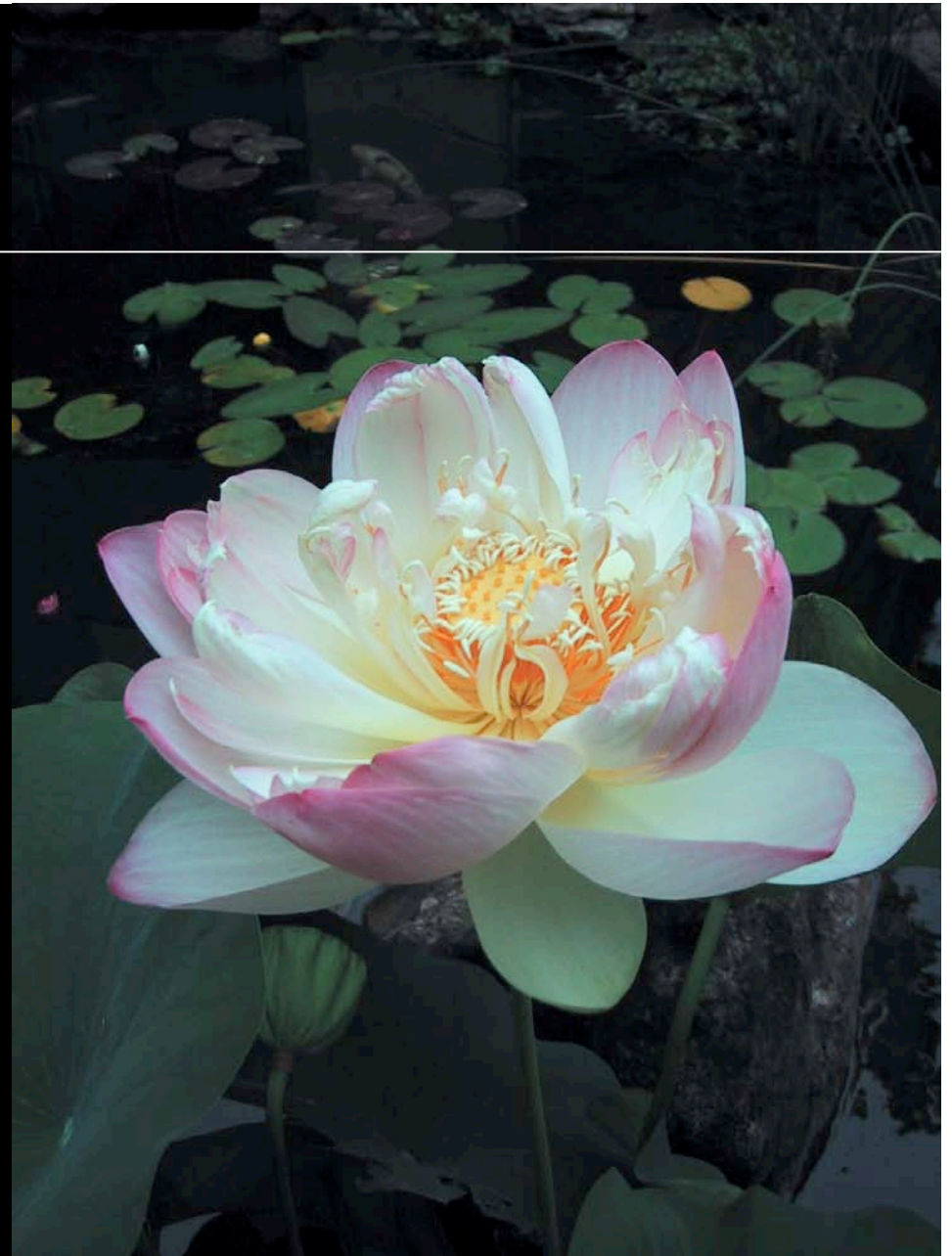
All of these figures are based on cost estimates created for each conceptual building model. All costs shown have been adjusted from actual cost estimates to reflect a \$10 million Market Building as a baseline. The Net Present Values indicated represent 30-, 60- and 100-year cost models that are based on 5% cost of capital, 1-1/2% inflation rate and 5% annual increase in energy costs.

Living Building	Plan	Wall Section	Energy to Operate Building	Grid Reliance	Pollution from Building Operation (20 yr.)	External Cost to Society (20 yr.)	Schedule	Construction Cost	Furniture, Fixtures and Equipment	Design and Management Fees	Net Present Value	Living Building
	100 Year Building 45 Wings Solar Orientation Natural Daylighting Living Machine®	3 Story Building Concrete Frame Raised Access Flooring Sun Shades Operable Windows Partially Daylit Parking Living Machine Photovoltaics (100%)	89			\$0		\$12.9 m	\$1.7 m	\$2.0 m	\$18.7 m 30 Year Model \$19.6 m 60 Year Model \$20.8 m 100 Year Model	
LEED™ Platinum		100 Year Building 45 Wings Solar Orientation Natural Daylighting Natural Ventilation	89			\$0.7 m		\$12.1 m	\$1.6 m	\$1.7 m	\$18.3 m 30 Year Model \$23.7 m 60 Year Model \$62.2 m 100 Year Model	LEED™ Platinum
LEED™ Gold		80 Year Building 65 Wings Solar Orientation Natural Daylighting	150			\$1.3 m		\$11.5 m	\$1.6 m	\$1.5 m	\$18.5 m 30 Year Model \$27.8 m 60 Year Model \$95.8 m 100 Year Model	LEED™ Gold
LEED™ Silver		80 Year Building 90 Wings Natural Daylighting	208			\$2.0 m		\$11.3 m	\$1.5 m	\$1.5 m	\$19.7 m 30 Year Model \$36.7 m 60 Year Model \$166.9 m 100 Year Model	LEED™ Silver
LEED™ Certified		40 Year Building 120 Wings Big Box	250			\$2.5 m		\$10.1 m	\$1.4 m	\$1.3 m	\$19.6 m 30 Year Model \$45.3 m 60 Year Model \$218.4 m 100 Year Model	LEED™ Certified
Market		40 Year Building 120 Wings Big Box	461			\$3.2 m		\$10.0 m	\$1.3 m	\$1.3 m	\$22.7 m 30 Year Model \$62.9 m 60 Year Model \$348.9 m 100 Year Model	Market

Copyright © 2002 The David and Lucile Packard Foundation

The Living Building

- Harvest all its own energy and water
- Adapted to climate and site
- Operates pollution free
- Promotes health and well-being
- Comprised of Integrated Systems
- Is Beautiful





Unlike the Packard Foundation, institutions commonly separate capital funding from operations, which frequently results in increased operating costs and reduced performance (including human health and productivity, flexibility, and durability).



A person is holding a large, thick red book in front of their face, completely obscuring it. The person's hands are visible, holding the book from the sides. They are wearing a light blue short-sleeved shirt and a gold chain bracelet on their left wrist. The background is a library with bookshelves filled with books, slightly out of focus.

Daylighting and Student Performance

Daylighting, Windows, Skylights

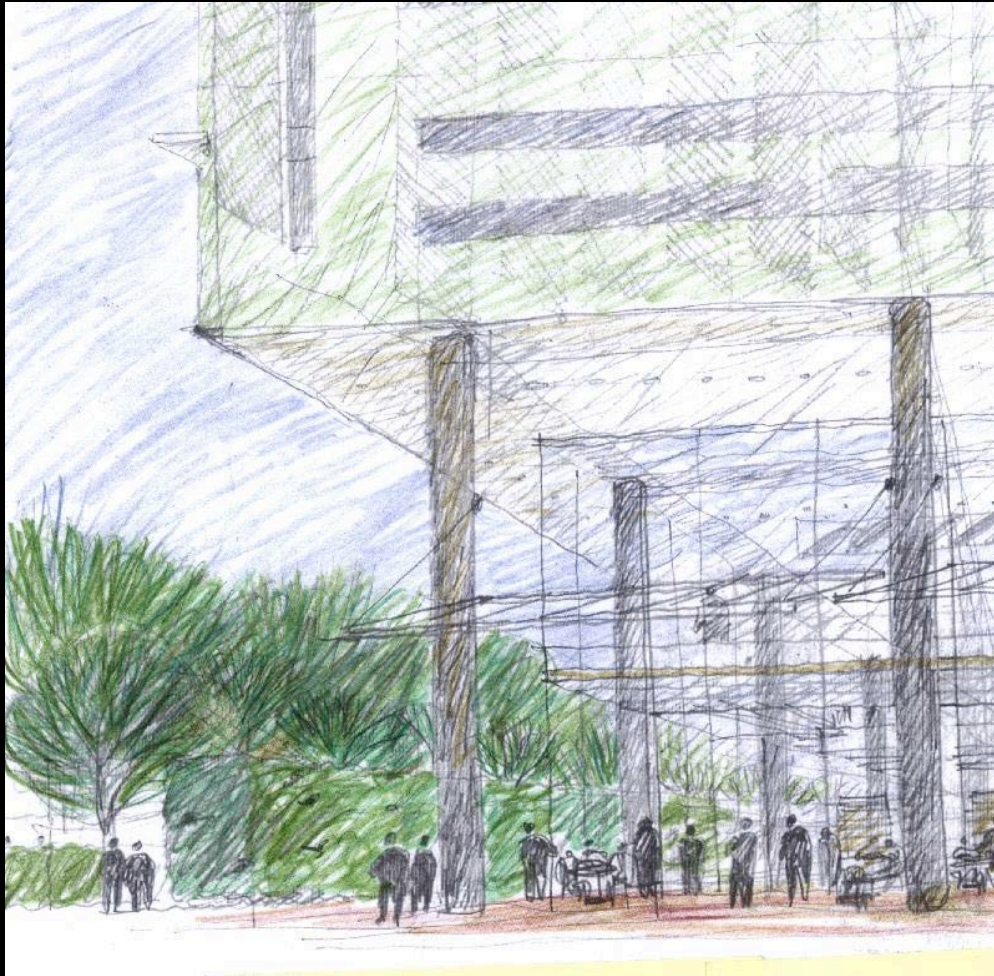
- 15-25% faster progress on math and reading tests
- 7-18% higher test scores

Ref:

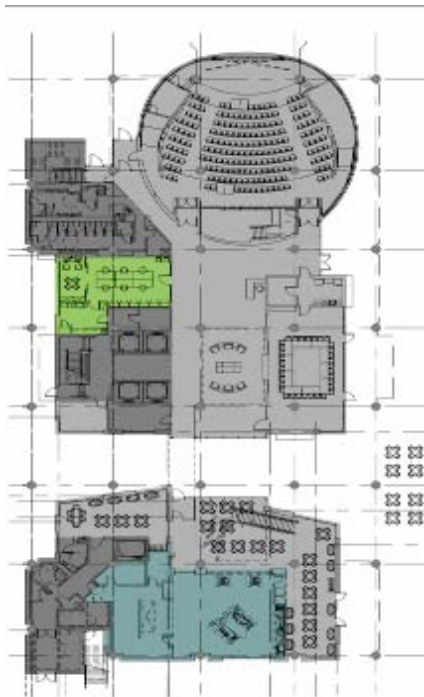
Heschong Mahone Group, "Daylighting in Schools: An Investigation into the Relationship Between Daylight and Human Performance," 1999. Available at: <http://www.h-m-g.com>;

Follow u

p studies verified the rigor of analysis and subsequent research continues to show positive correlation between daylighting and student performance.



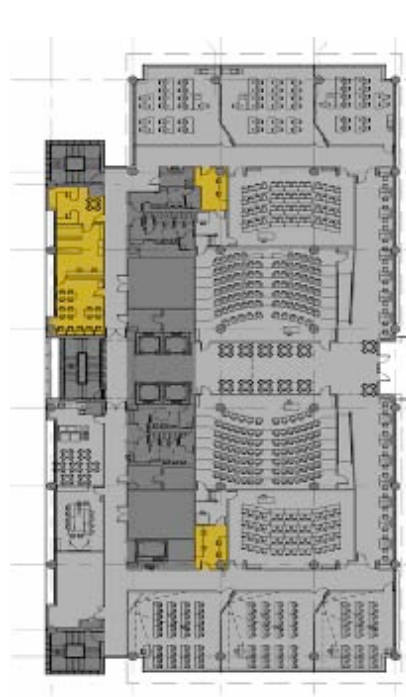
breezeway: park connection



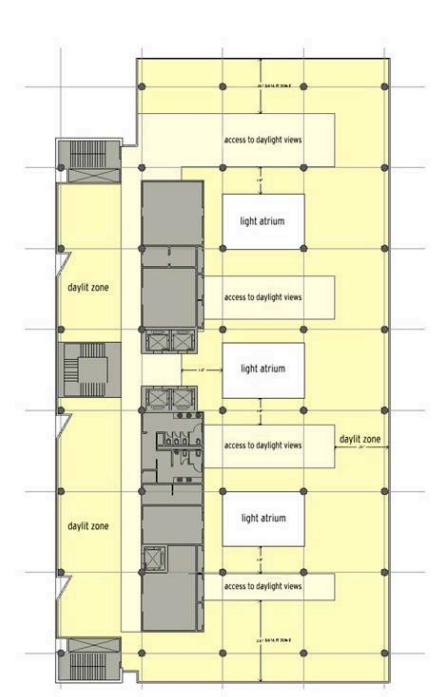
First Floor



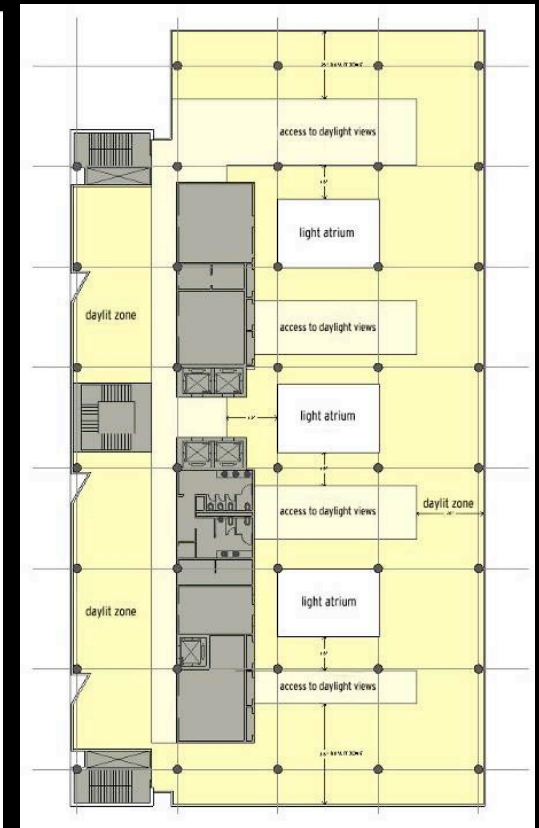
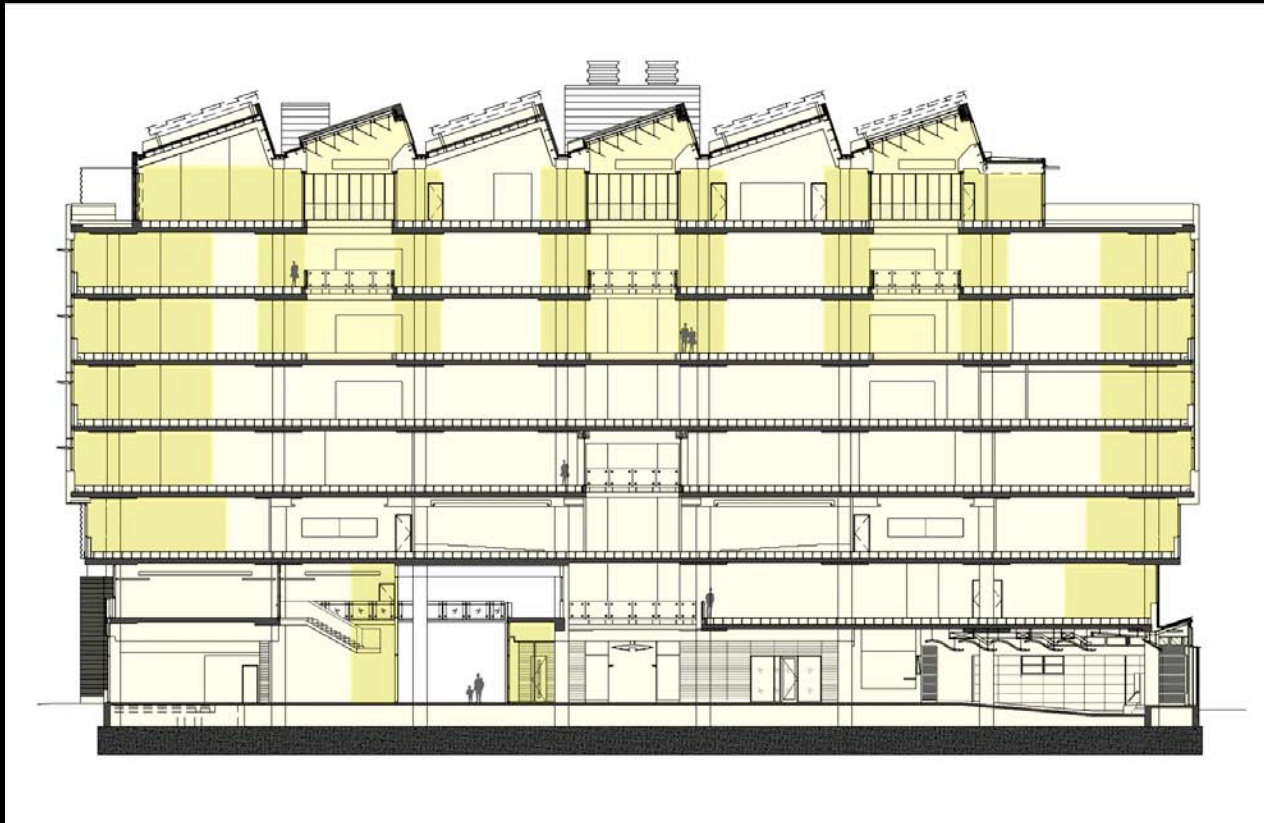
Second Floor



Third Floor

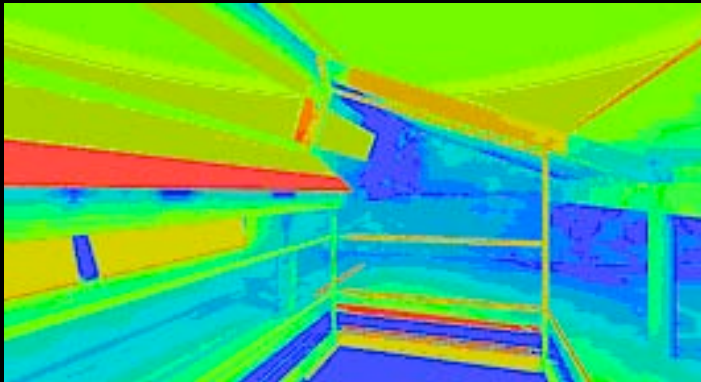


Plan

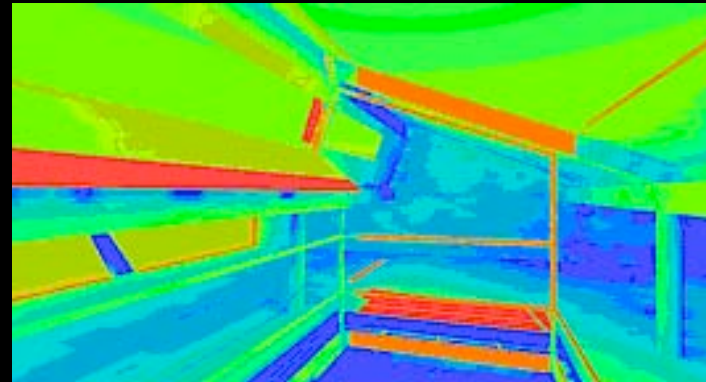


section from east showing daylit areas

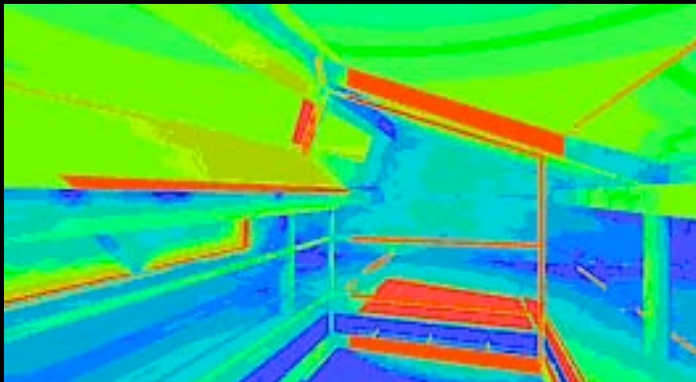
Shading Control



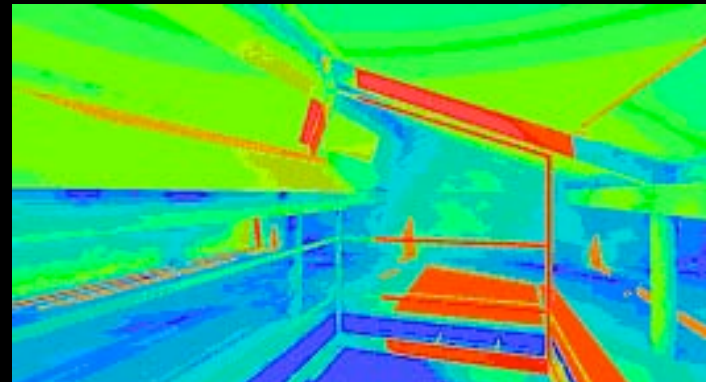
1 PM



2 PM



3 PM



4 PM

Sun-patch dynamics; Houston, Summer – clear sky



School of Nursing and Student Community Center

University of Texas Health Science Center at Houston



School of Nursing and Student Community Center

University of Texas Health Science Center at Houston



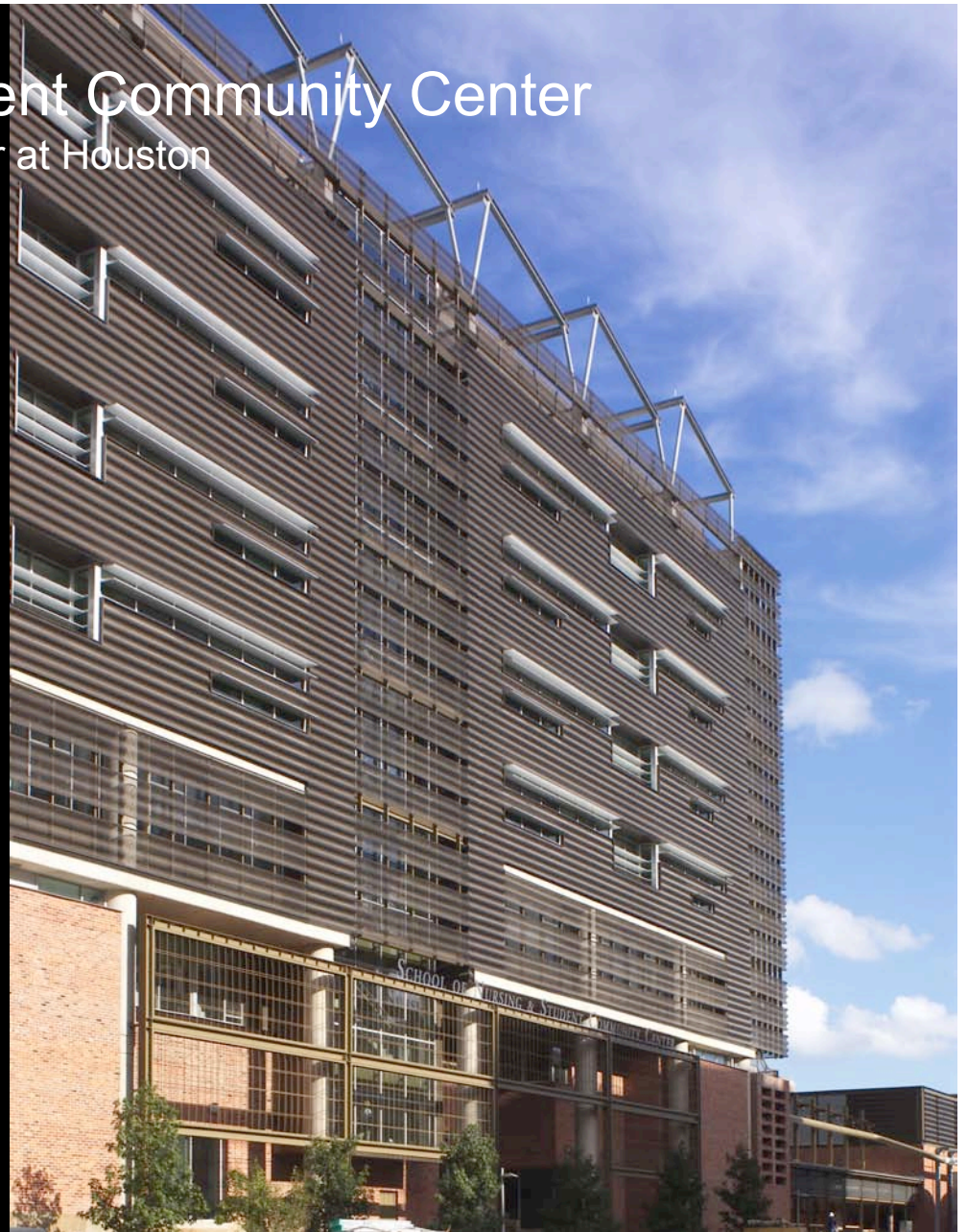
School of Nursing and Student Community Center

University of Texas Health Science Center at Houston



School of Nursing and Student Community Center

University of Texas Health Science Center at Houston



School of Nursing and Student Community Center

University of Texas Health Science Center at Houston



School of Nursing and Student Community Center

University of Texas Health Science Center at Houston



School of Nursing and Student Community Center

University of Texas Health Science Center at Houston



School of Nursing and Student Community Center

University of Texas Health Science Center at Houston



School of Nursing and Student Community Center

University of Texas Health Science Center at Houston







east elevation

Economic Impact

SCHOOL OF NURSING AND
STUDENT COMMUNITY CENTER



HARRIS COUNTY



TEXAS



UNITED STATES
OF AMERICA

BASELINE

OUTPUT

TOTAL VALUE OF PRODUCTS SHIPPED

20.1 M

3.6 M

9.1 M

JOBS

FULL TIME EQUIVALENT

196.07 JOBS

44.48

67.1

INCOME

6.8 M

.87 M

3.04 M

FINAL DESIGN

OUTPUT

TOTAL VALUE OF PRODUCTS SHIPPED

25.39 M

1.16 M

11.4 M

JOBS

FULL TIME EQUIVALENT

212.67 JOBS

26.59

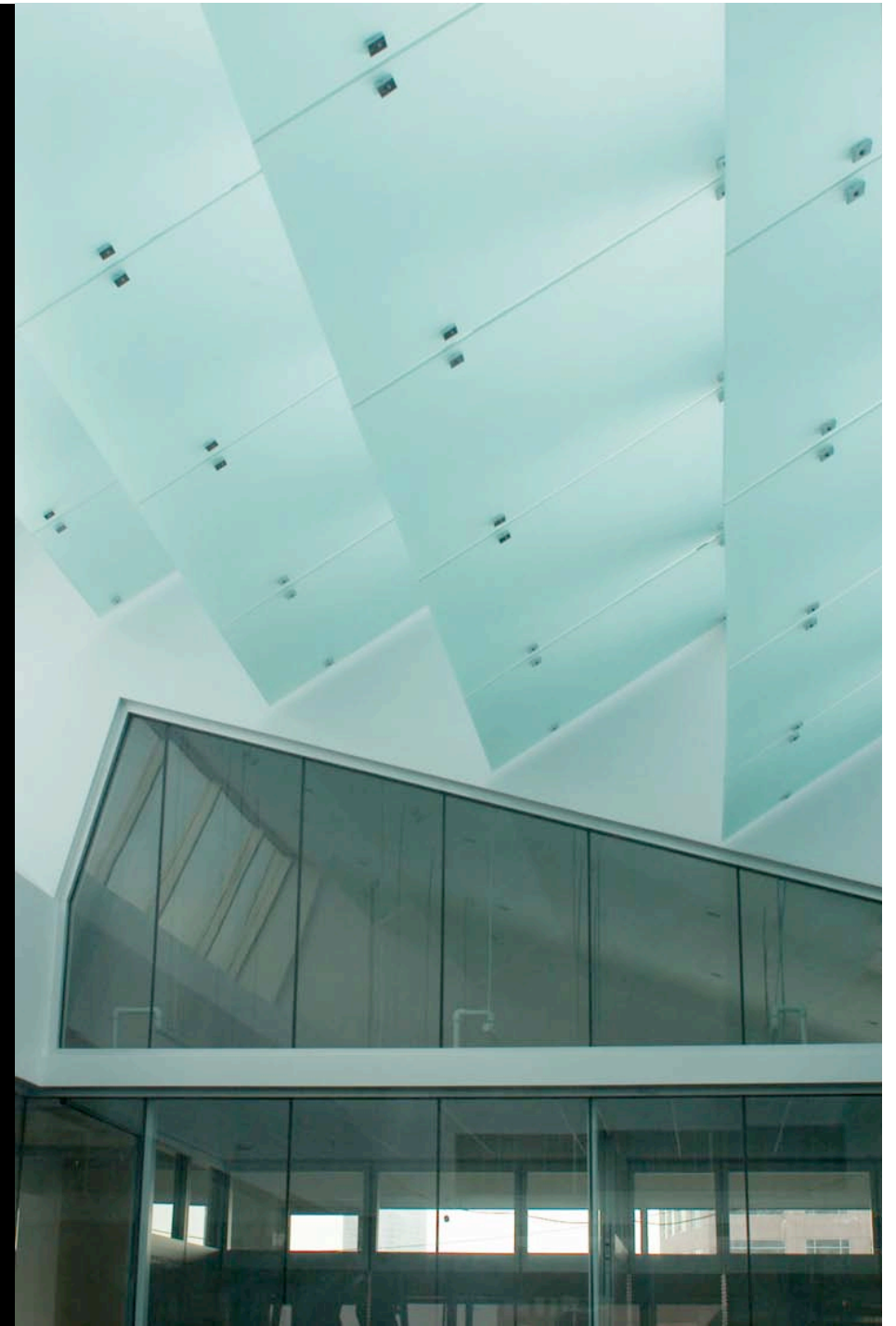
77.81

INCOME

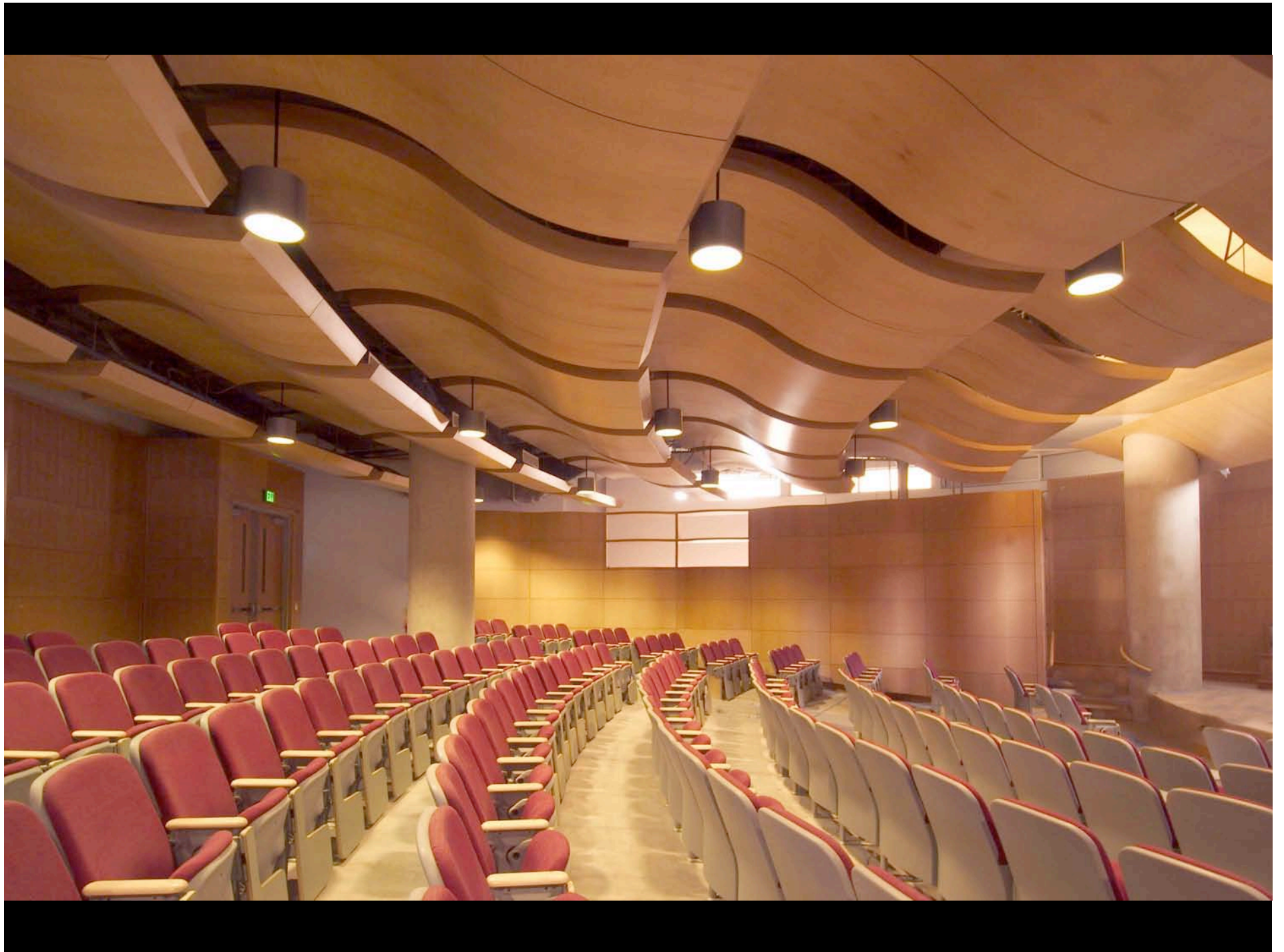
7.96 M

.4 M

3.82 M









INSTITUTE OF MOLECULAR MEDICINE, HOUSTON TX



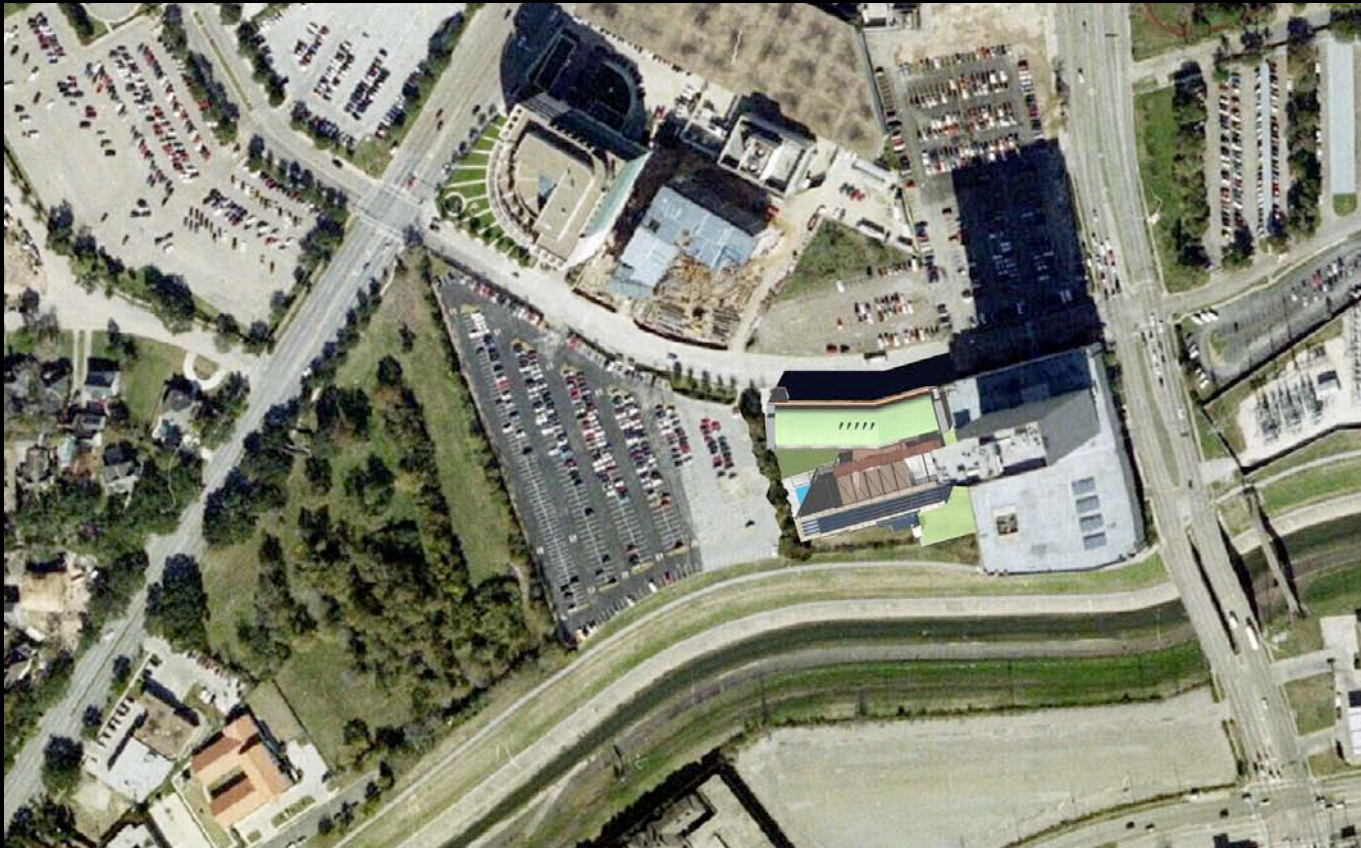
Campus Concept



Figure Ground

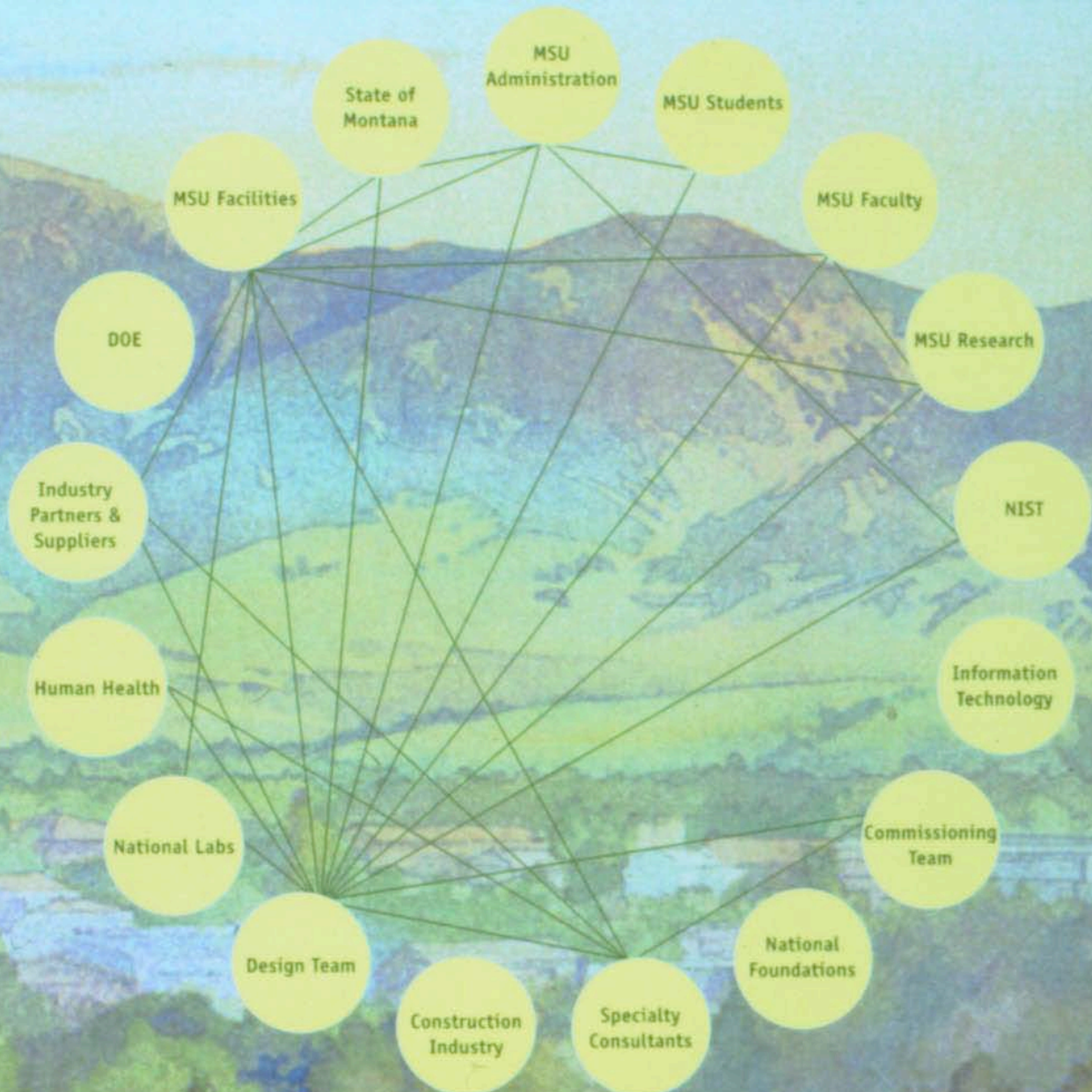


Green Spaces





Performance Team Decision



COMMUNICATION ORGANIZATION CHART



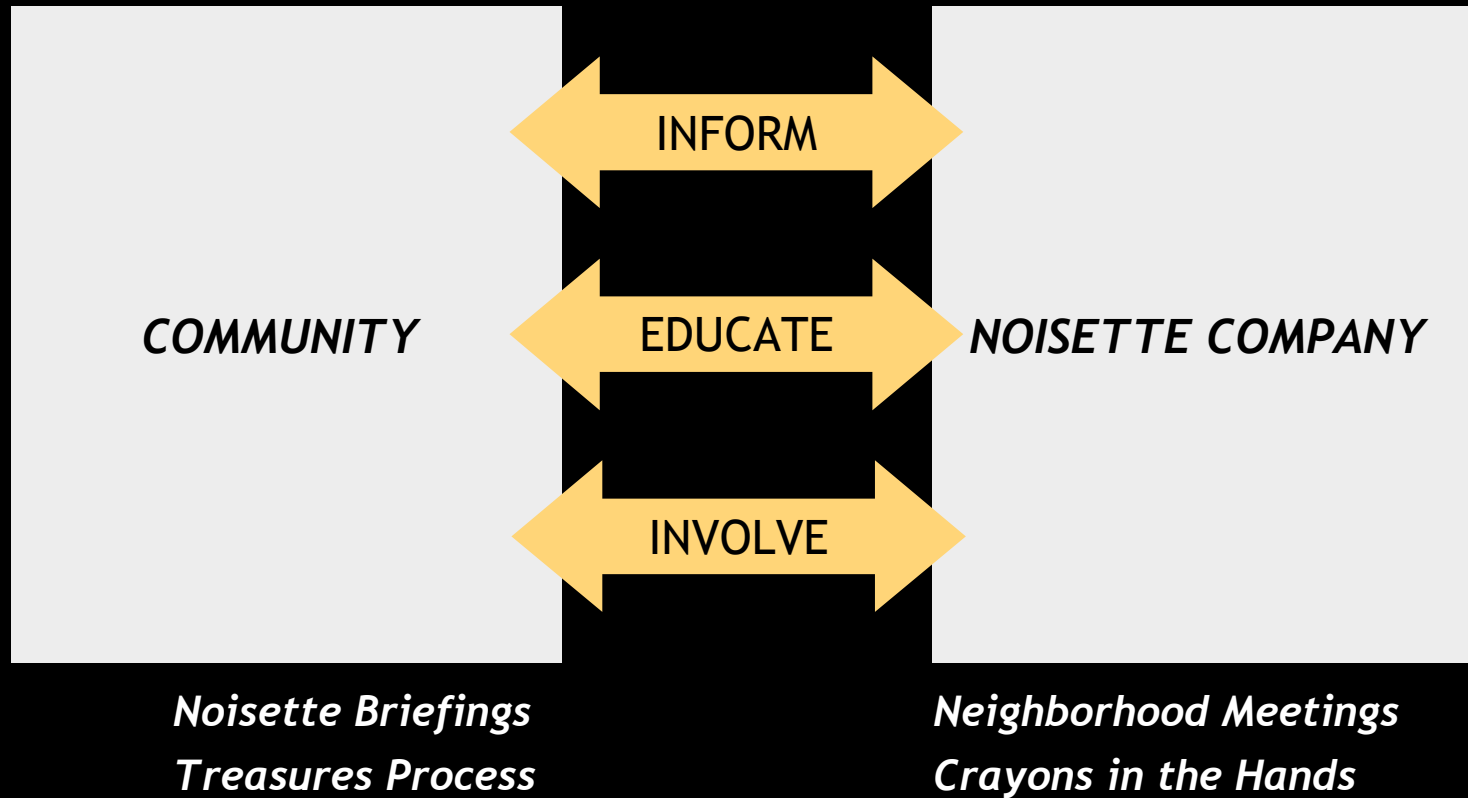
NORTH CHARLESTON REDEVELOPMENT | BNIM + BHKR





Community Involvement

PURPOSE: *Partner the wisdom of the community with the expertise of the development team to emerge the best solutions.*



Community-Based Planning Process



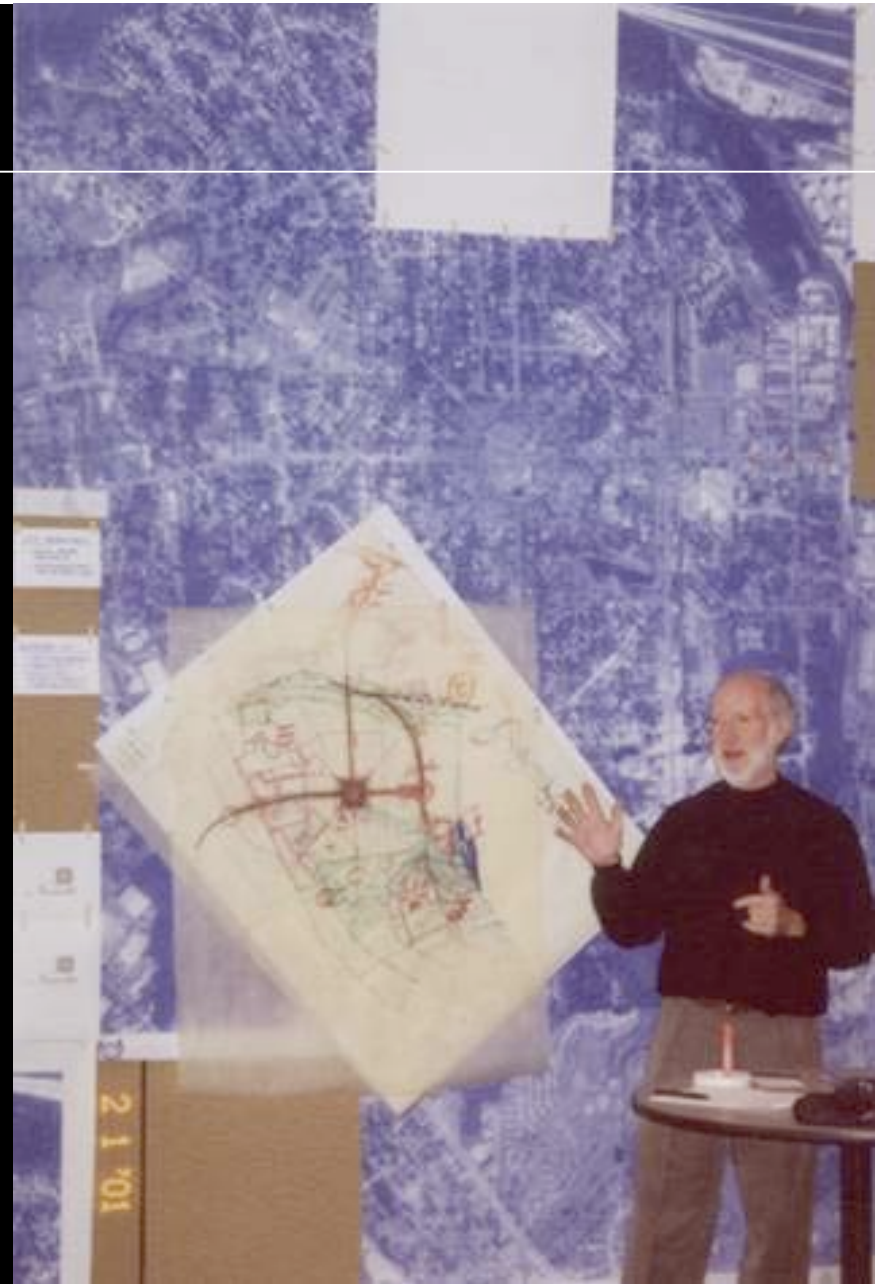
Create a socially durable community by informing, educating, and involving the citizens.

Four Step Process:

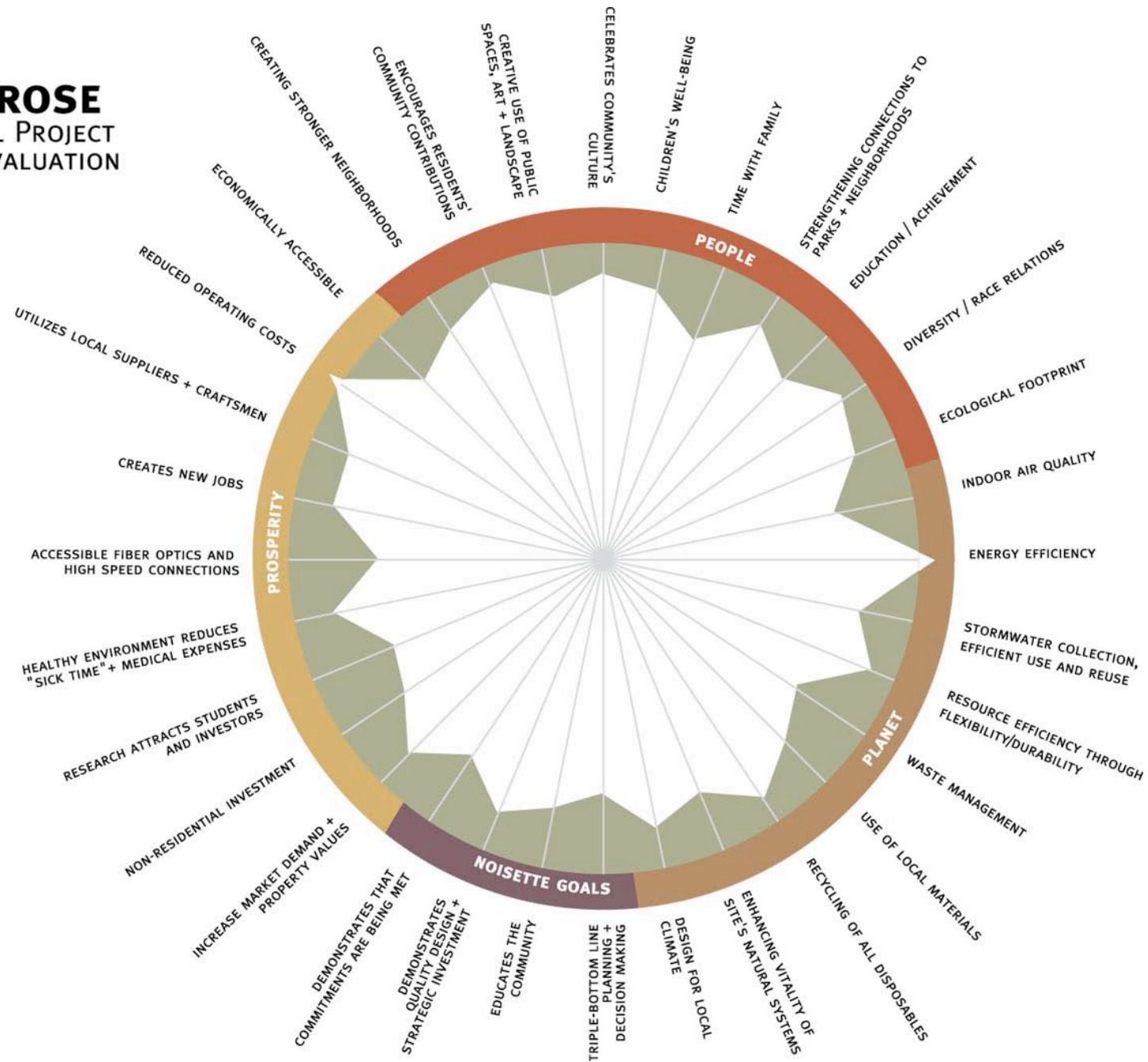
- Get to know
- Eat and Greet
- Treasures
- Crayons in the hand

Master Plan Process

- A vision, not a plan – developer as integrator
- Creating the Noisette brand
- Role of developer as planner/zoning/community organizer/ economic development/ educator
- Establishing the self-worth of the community



NOISETTE ROSE
EXAMPLE SCHOOL PROJECT
HYPOTHETICAL EVALUATION



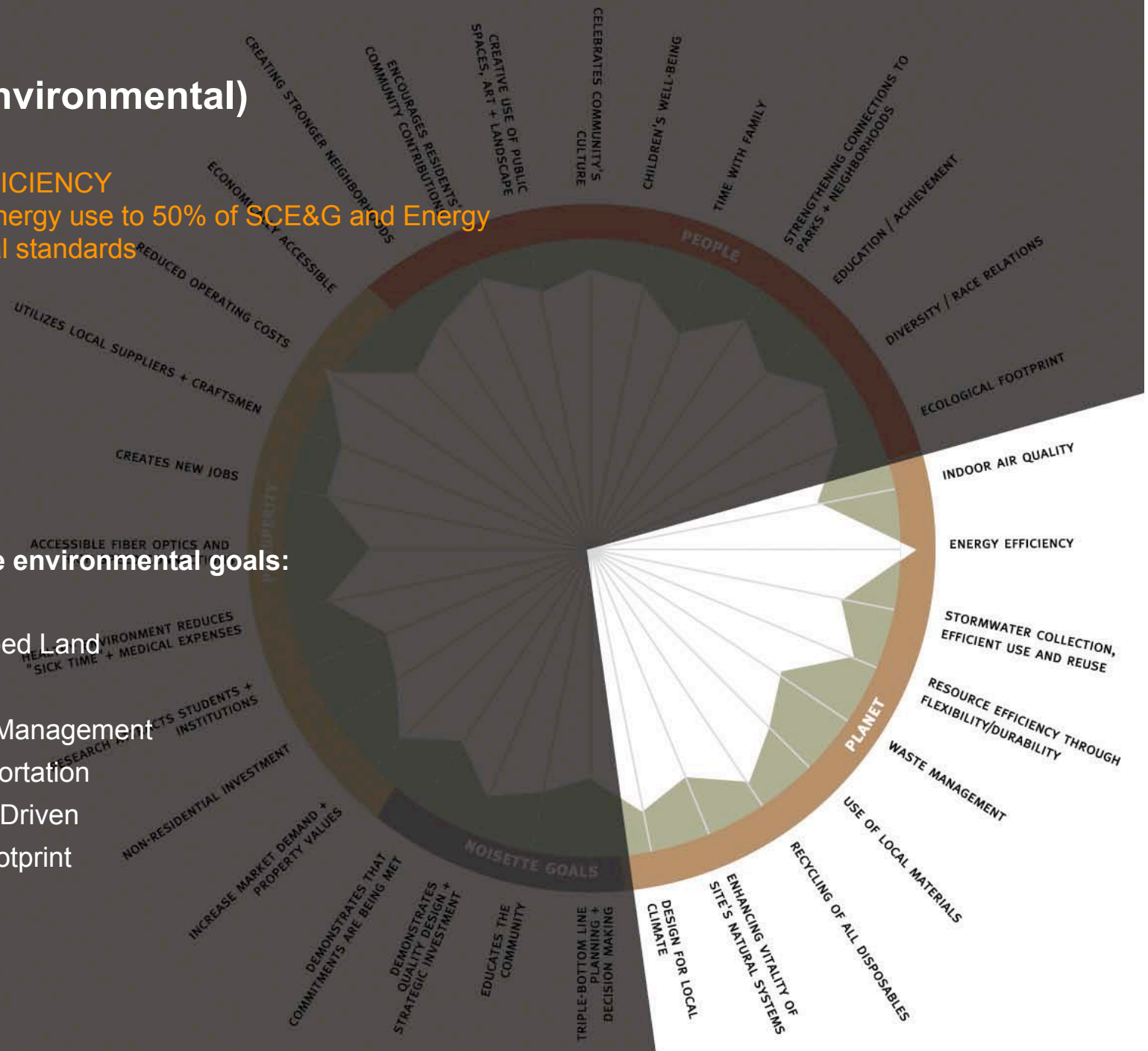
Planet (environmental)

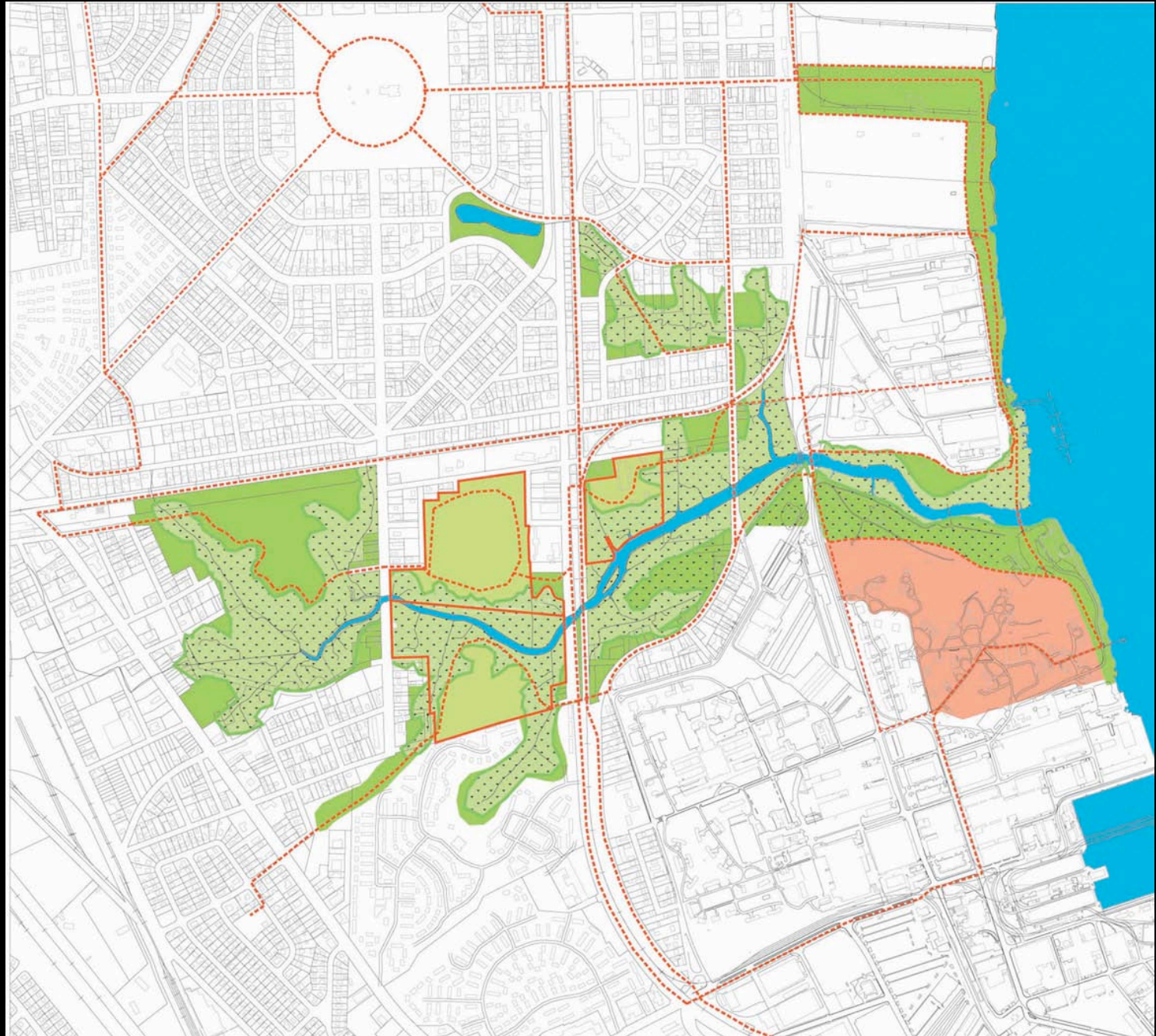
ENERGY EFFICIENCY

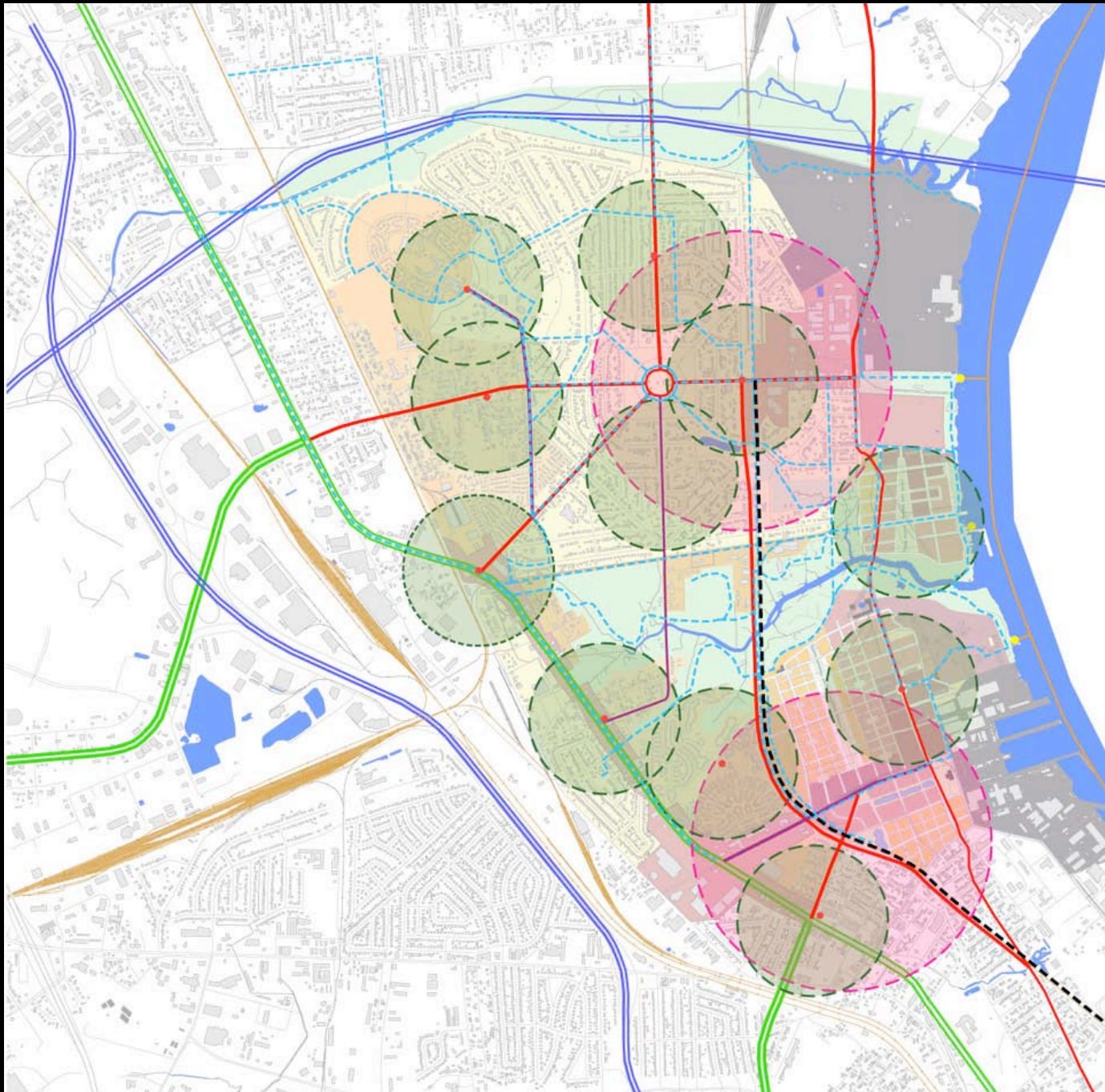
Goal to limit energy use to 50% of SCE&G and Energy Star residential standards

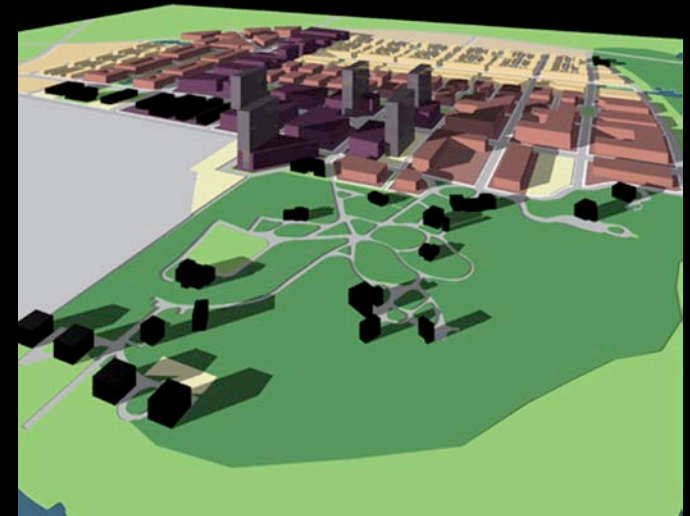
Other possible environmental goals:

- Air Quality
- Underdeveloped Land
- Water Quality
- Storm Water Management
- Public Transportation
- Vehicle Miles Driven
- Ecological Footprint







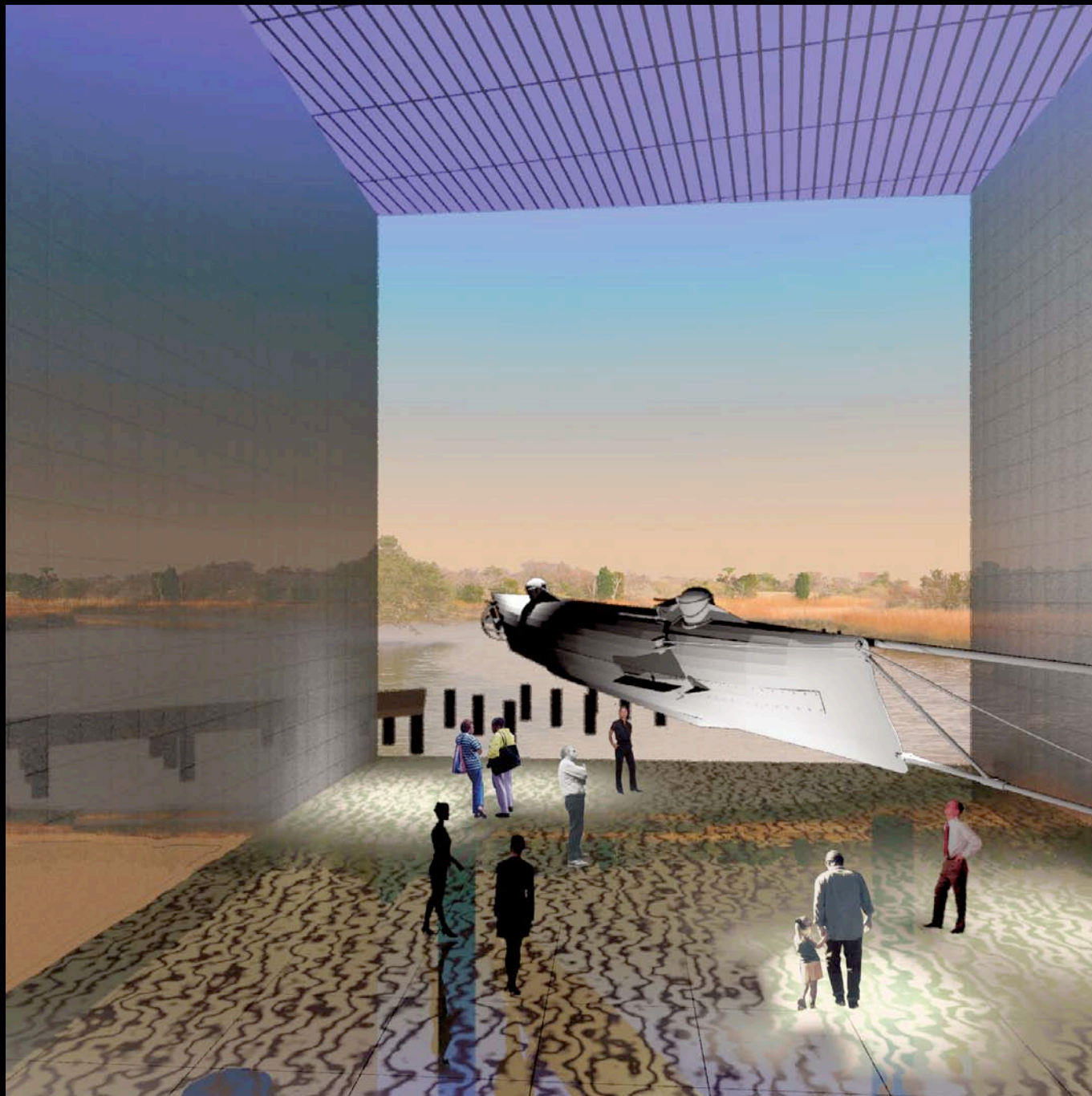


North Charleston Point Pavilion





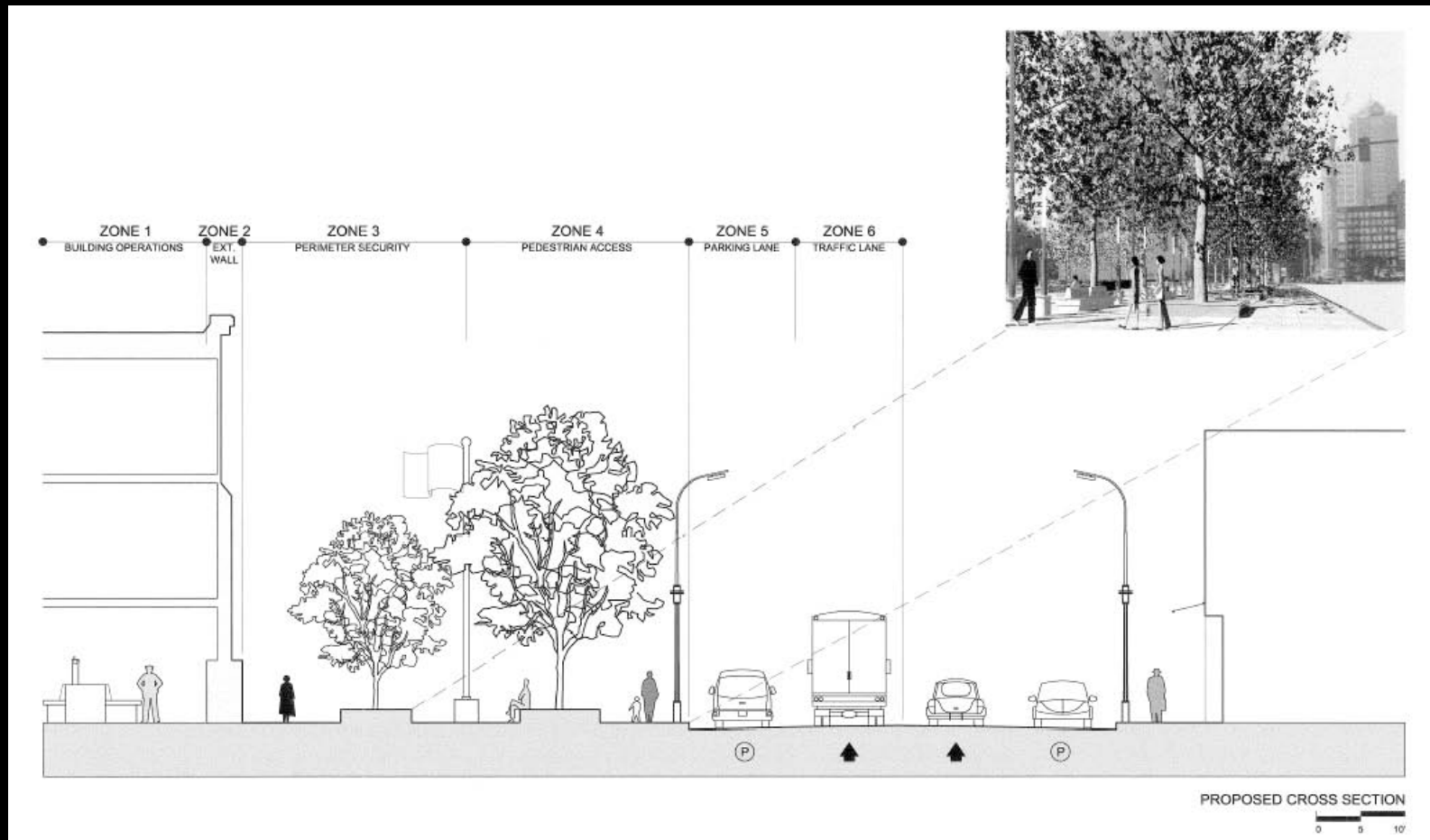








National Security: Homeland Security fuels a fear-based society



National Security: Homeland Security fuels a fear-based society



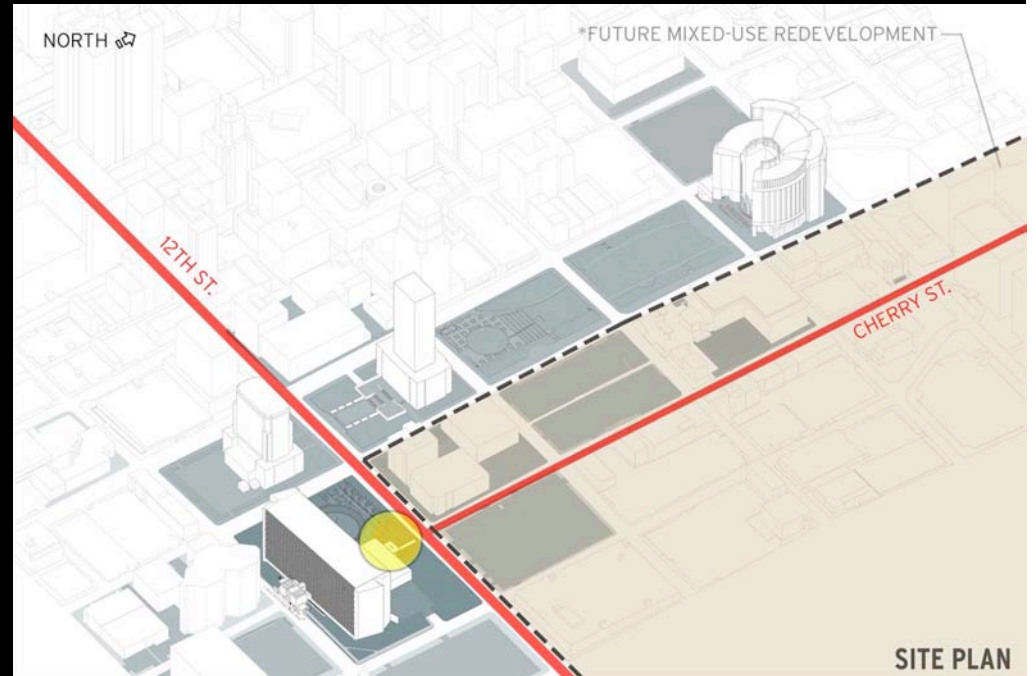
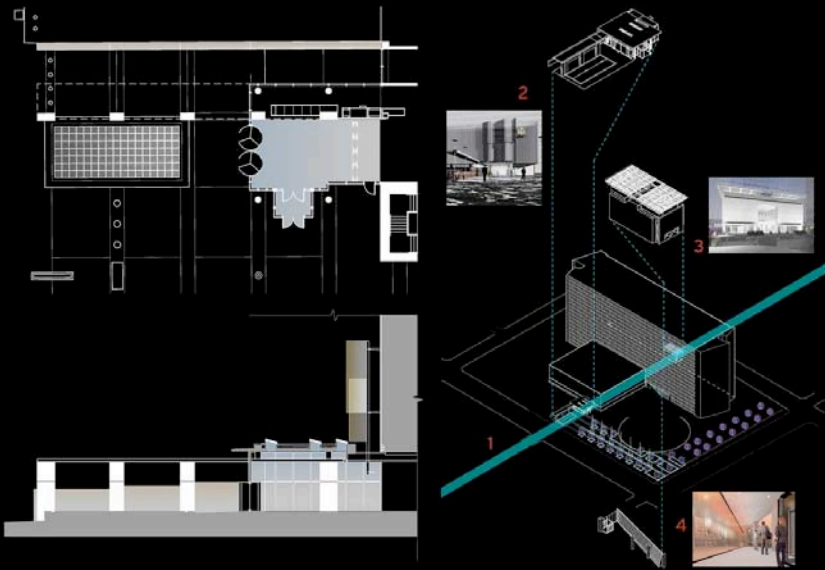
Social Capital: *The social network and interactions which inspire trust and reciprocity among citizens.*

- “The more integrated we are with our community, the less likely we are to experience colds, heart attacks, strokes, cancer, depression, and premature death of all sorts...*Over the last twenty years more than a dozen large studies...have shown that people who are socially disconnected are between 2 and 5 times more likely to die from all causes, compared with matched individuals who have close ties with family, friends and community.*”
 - Kevin M. Leyden, PhD

Bolling Federal Building - before



Bolling Federal Building



Bolling Federal Building



Bolling Federal Building

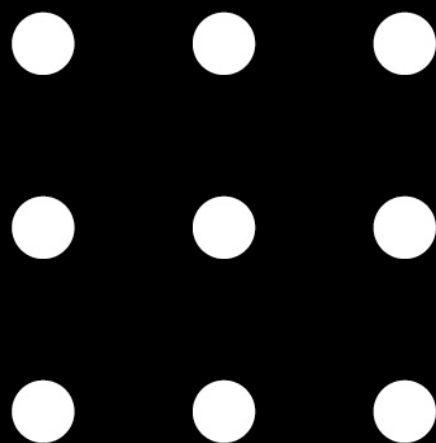


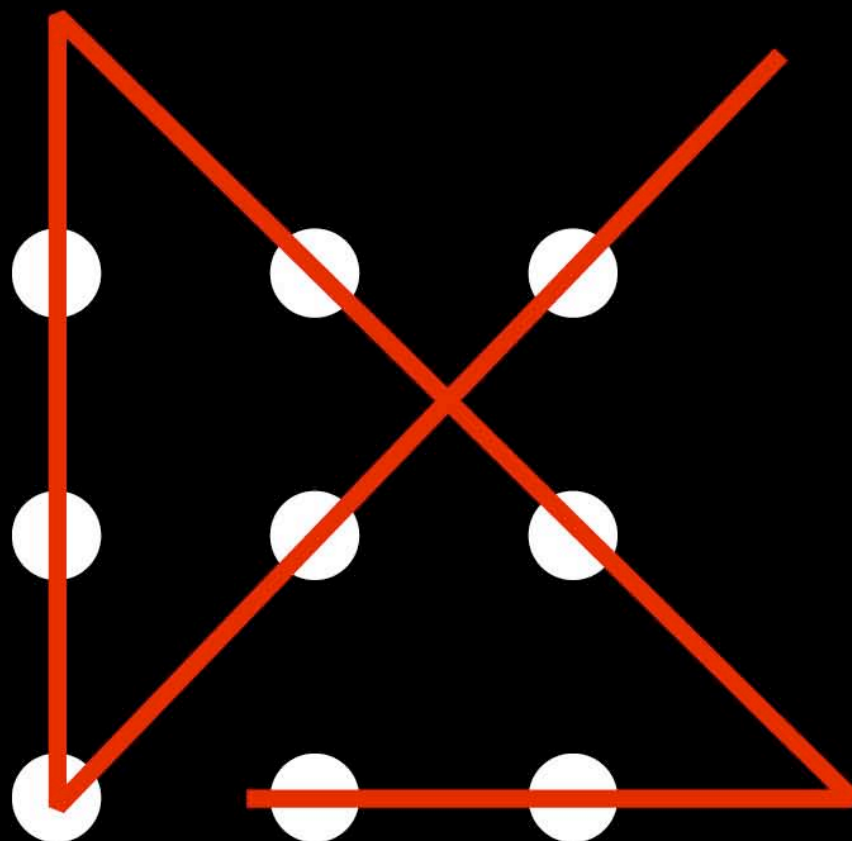


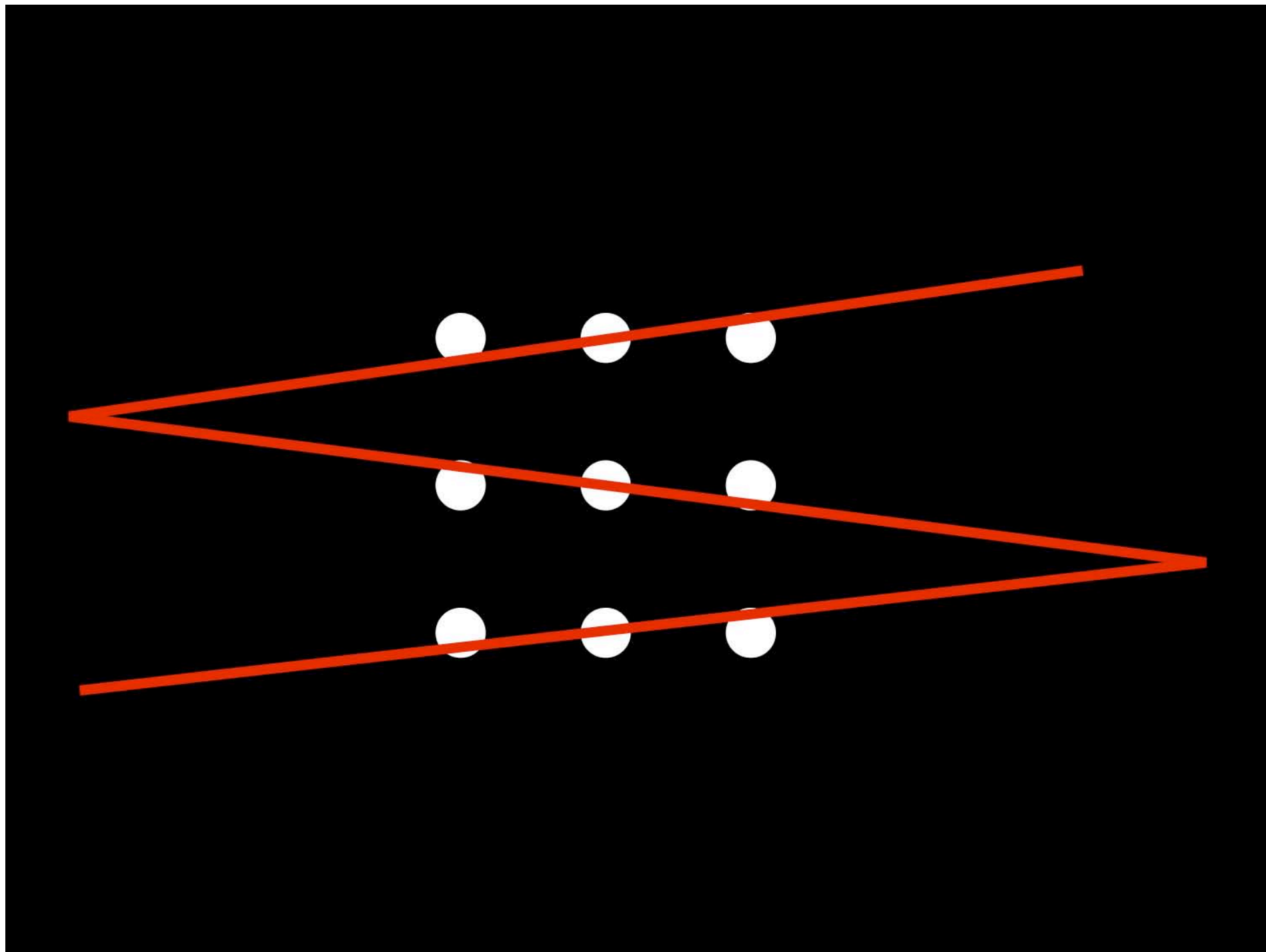
A close-up photograph of a pair of hands, palms up, holding a small orange butterfly with black markings on its wings. The hands are positioned in the center of the frame, with the butterfly resting on the fingers. The background is a soft, out-of-focus light blue and white. The entire image is framed by a thick black border.

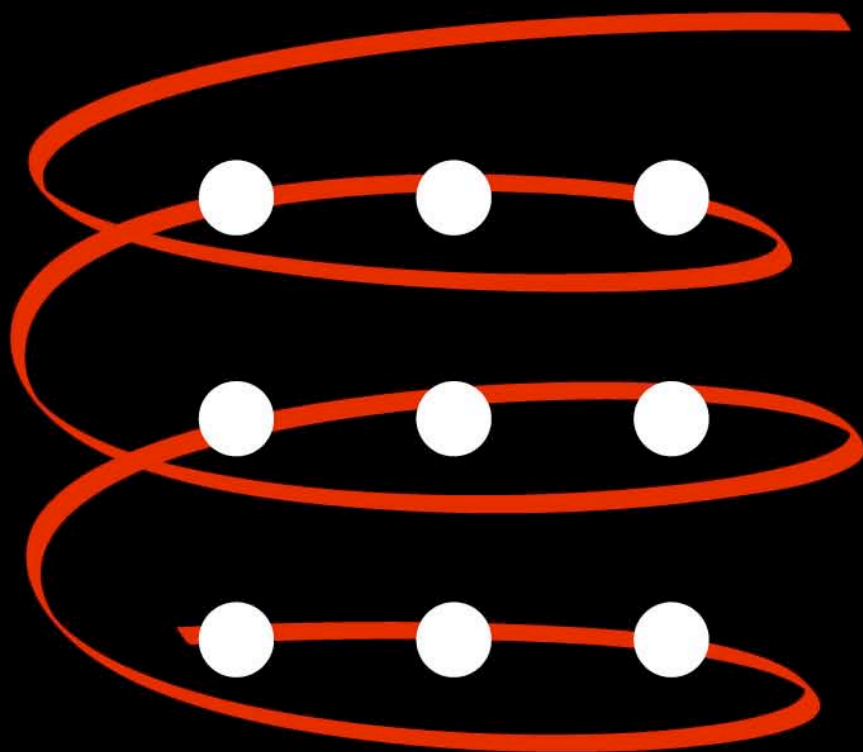
"The best way to predict the future is to design it."

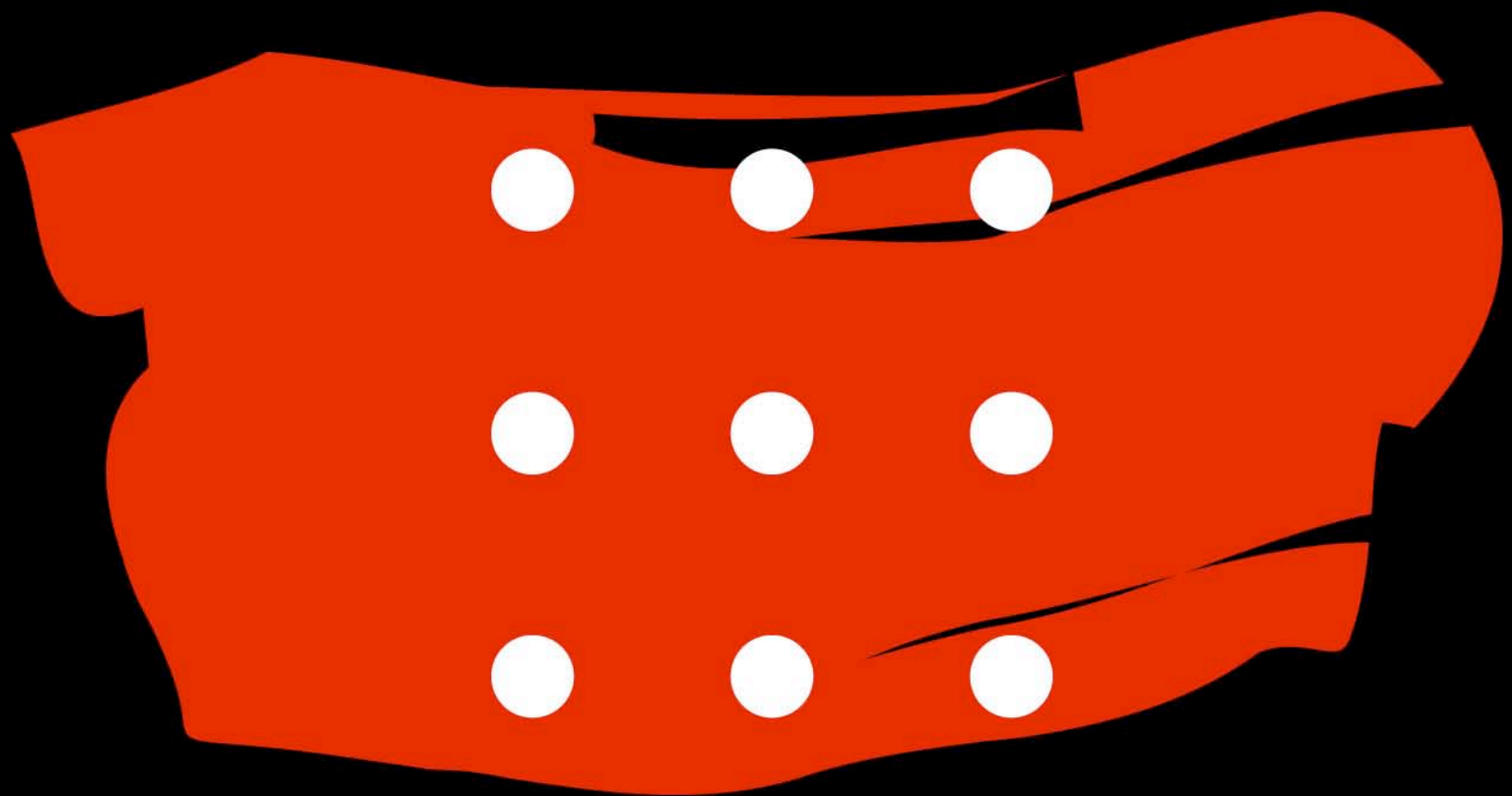
-Buckminster Fuller











Two pink pigs with large, feathered wings are flying in a clear blue sky. The pig in the foreground is larger and closer to the viewer, while the pig in the background is smaller and further away. Both pigs are looking towards the camera. The pig in the background is holding a small white daisy flower in its mouth.

Integrated Design When Pigs Fly



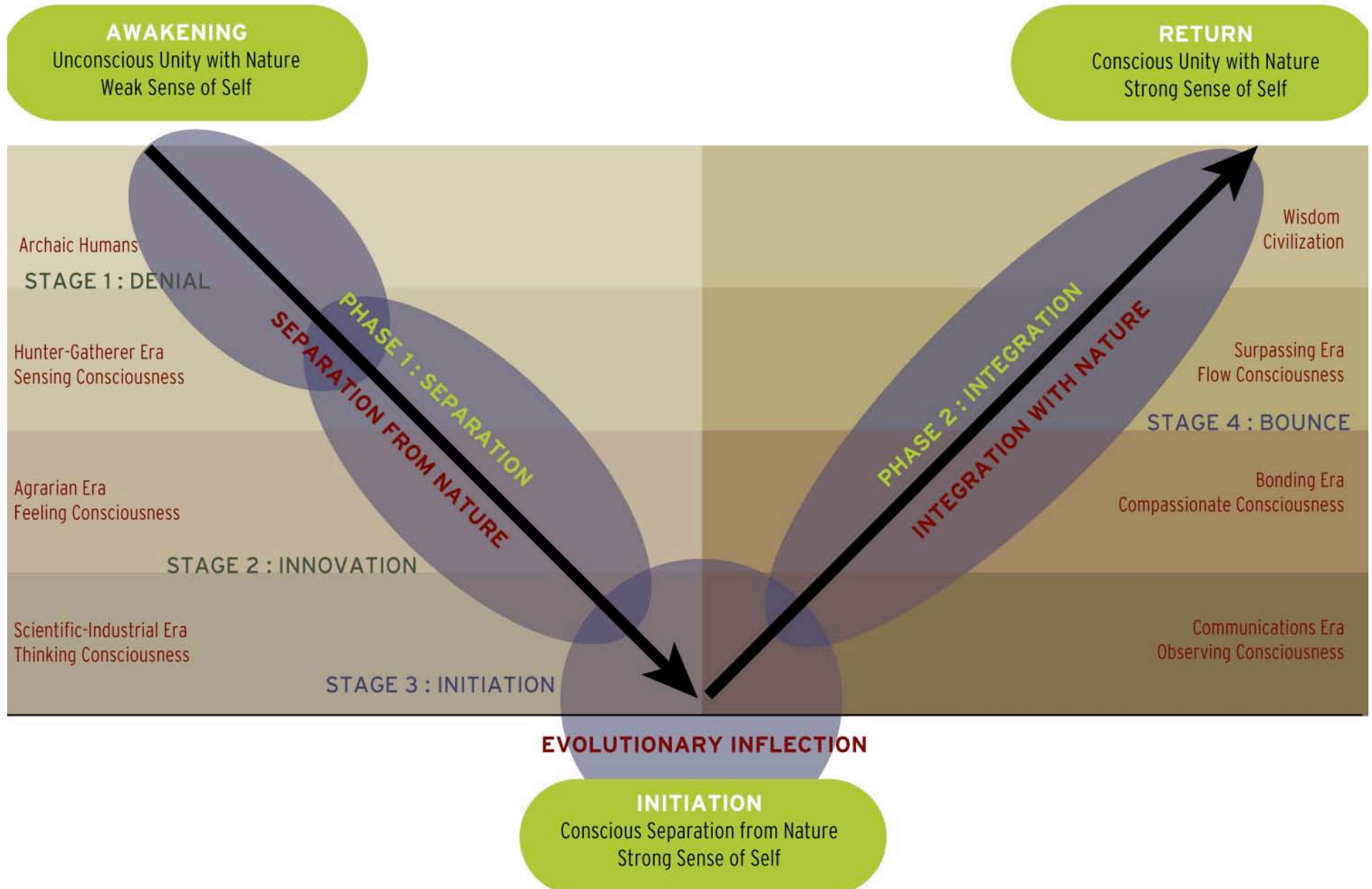
USGBC
10 November 2004

Bob Berkebile, FAIA
BNIM Architects

TWO MAJOR PHASES IN THE HUMAN JOURNEY

STAGES OF EVOLUTIONARY INITIATION + TRANSITION

STAGES IN THE UNFOLDING OF CIVILIZATION + CONSCIOUSNESS





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bnim.com | elements@bnim.com

Questions or More Information